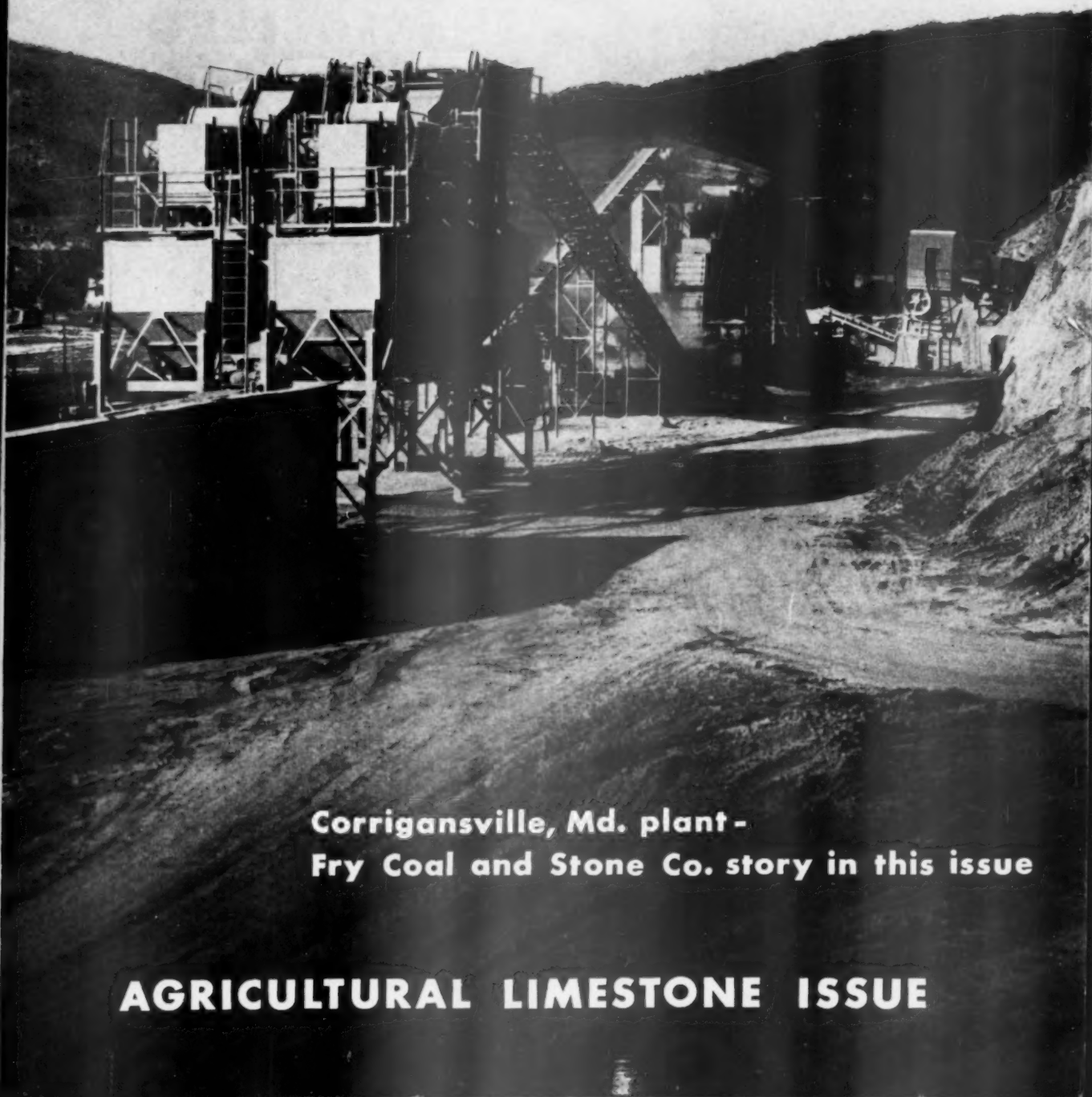


THE INDUSTRY'S RECOGNIZED AUTHORITY

# ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

**APRIL 1954**



**Corrigansville, Md. plant -  
Fry Coal and Stone Co. story in this issue**

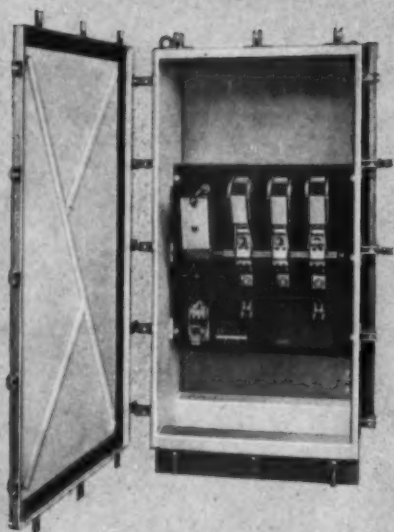
**AGRICULTURAL LIMESTONE ISSUE**



# **SPECIALIZED CONTROL for a ROUGH TOUGH JOB**

ALLIS-CHALMERS

## **CONTROL**



400-horsepower, 440-volt controller for squirrel-cage motor or primary of wound-rotor motor. Dust-tight enclosure.

### **Custom-Engineered Protection for Motors Driving Crushers**

**P**ROTECTING A MOTOR driving an ore or rock crusher is a particularly complex control problem. In crushing, motor burdens (resulting from high inertias or extreme fluctuation of loads) dictate protection far beyond that provided by standard controllers. Only control engineered for your specific job can provide adequate protection.

An Allis-Chalmers control application starts with expert analysis of your problem by an A-C representative. Type of crusher, specific crushing conditions, and cost weighed against lost production are all factors in determining the kind and degree of protection he will specify. All recommendations are backed by complete research and testing facilities . . . by unsurpassed skill and experience in design, manufacture and application. For complete information, call your nearby A-C representative or write for Bulletin C53-424, Allis-Chalmers, Milwaukee 1, Wis.

A-4306

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RESEARCH KEEPS

# B.F. Goodrich

FIRST IN RUBBER



## After two million tons, a new job for this cord belt

**T**HAT'S just one section of the 3300-foot conveyor system on the Folsom Dam project. A series of belts, like a bucket brigade, deliver 550 tons of aggregate an hour from bunkers across a river to the cement batch plant you see in the background.

In choosing the belts, engineers knew the ordinary type could not handle the entire job because of the sharp 139-foot lift up to the screening tower. They needed a belt that was strong, yet flexible for the long, steep climb, so a B. F. Goodrich cord belt was selected.

This B. F. Goodrich belt is made of

plies of parallel cords that run lengthwise. Each cord is completely surrounded by rubber—no cross threads tie them together. The parallel cords supply the extra strength, yet are flexible so that troughing is natural, belt keeps centered on idlers, spillage is held to a minimum.

And because of the cord belt's ability to withstand impacts, cutting, and heavy loads, the belt in the picture is expected to carry the 2,000,000 tons needed here, and then be moved to another construction site for many more years of useful service.

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tell and show you why BFG cord belts are able to give you this kind of service consistently (not just once in a while) in quarries, ore mines, and on construction jobs where severe operating conditions require the best and most modern conveyor belt construction for the most dependable, economical performance. *The B. F. Goodrich Company, Dept. M-214, Akron 18, Ohio.*

**B.F. Goodrich**  
**INDUSTRIAL PRODUCTS**  
**DIVISION**



# ROCK PRODUCTS



APRIL, 1954

THE INDUSTRY'S RECOGNIZED AUTHORITY

VOL. 57, No. 4

**Bror Nordberg**  
Editor

**Nathan C. Rockwood**  
Editorial Consultant

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**Trailer • Doorless Pan •** Standard equipment for low-cost hauling in mines and quarries throughout the world. Doorless two-way side-dump. Capacities 8-20 tons. Dumped by job-fitted **Easton HE-20** electric overhead hoist. Remote, push-button control.



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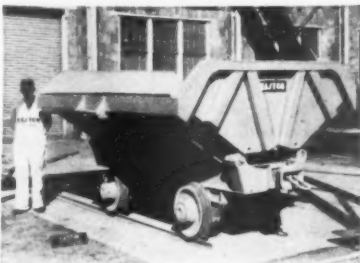
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**EASTON CAR & CONSTRUCTION COMPANY • EASTON, PA.**

ROCK PRODUCTS, April, 1954

# No costly delays to change steels with **TIMKEN®** interchangeable rock bits!



*Dozens of different Timken® rock bits fit the same drill steel!*

**Y**OU get quick bit changes plus the right bit for the job when you use Timken® multi-use and carbide insert bits.

It takes just a minute to unscrew one type of Timken bit and screw another different bit on the same drill steel—right on the job! No time wasted going after another set of drill steels.

You get added drilling economy because the driller can switch to the most economical bit as the ground changes. And you eliminate the need for stocking a large inventory of different steels. Dozens of different Timken multi-use and carbide insert bits are interchangeable on the *same* drill steel.

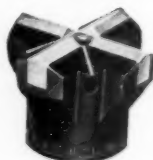
Both Timken multi-use and carbide insert bits give you two important advantages: 1) made from electric furnace Timken alloy steel, 2) special shoulder union that keeps drilling impact from damaging threads.

Our rock bit engineers will be glad to help you with your drilling problems. They're experts in cutting drilling costs. There's no obligation. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



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Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest costs per foot of hole when full increments of steel can be drilled.



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Give highest speed through hard, abrasive ground. Also most economical for constant-gage holes, small-diameter holes, very deep holes.

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for the best bit  
... for every job

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# ROCK MEN will tell you

## ALL NORTHWESTS are Real ROCK SHOVELS!



If you  
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in Rubber Mounted  
equipment be sure to  
see the Northwest  
Truck Crane before  
you buy.

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Here are three pits of the many in Pennsylvania using Northwests. All of them are operating Northwest repeat order machines. Their business is rock — and tough rock! They found that their first Northwest had the qualities they needed — qualities and advantages that make the Northwest a *Real Rock Shovel*.

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Ask the rock men and remember if you have a *Real Rock Shovel* you never have to worry about output in any digging.

### NORTHWEST ENGINEERING COMPANY

135 South LaSalle Street  
Chicago 3, Illinois

(Top) D. M. Stoltzfus & Son, Inc., has purchased a third Northwest for their pits at Talmage, Pa.  
(Center) White Rock Quarries at Bellefonte, Pa., are now operating their 8th Northwest.  
(Bottom) White Pigment Corp., at York, Pa., have recently put their 2nd Northwest to work.

# NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

Convertible for any Mining Material Handling or Excavation Problem

ROCK PRODUCTS, April, 1954

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## **CALLS FOR SECO VIBRATING SCREENS**



*Photographed on the job, Materials Service, Inc., Windsor Locks, Conn.*

### **And Smooth Screening Pays Off in Better Sizing and Less Maintenance**

Talk with operators about vibrating screen requirements and one thing seems to stand out every time: to be a *good performer* . . . a vibrating screen must be a *smooth performer*!

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**SECO**  
TRUE CIRCULAR ACTION  
**VIBRATING SCREENS**

#### **SMOOTH OPERATING SECOS FOR EVERY SCREENING JOB**

Whatever your screening requirements, we welcome your inquiry.

Over 300 models in single, double, triple and 3½ decks. Send for Catalog No. 203.

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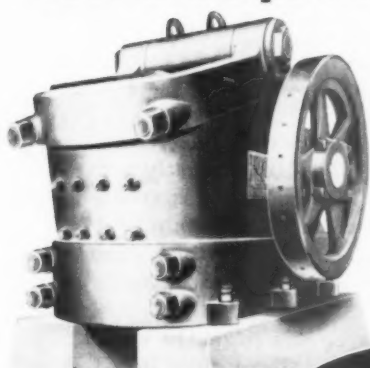


### ENGINEERING SIDELIGHTS OF THE ENCLOSING DIKE OF THE ZUIDER ZEE:

The first step in reclaiming the fertile soil of the Zuider Zee, was construction of a massive, 20 mile long dike to connect Friesland and Noord-Holland Provinces. This converted the Zuider Zee into quiet IJssel Lake, ready for drainage and land reclamation. A serious problem arose during tide changes as dike neared completion. The narrower the outlet became between trapped water and open sea, the greater became the velocity of escaping water. Disaster threatened unless men plugged the gap faster than the sea washed material away. Hard work and great skill finally won the battle. The dike was finished in 1932 . . . a project which required six years to complete. This massive construction feat stands as its own monument to the skill of the Dutch . . . master builders of dependable bulwarks for productive land.

PHOTO COURTESY OF NETHERLANDS INFORMATION SERVICE.

## Massive Traylor Type R Jaw Crusher Builds Output to Safeguard Production Quotas



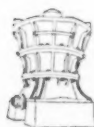
Traylor R Jaw Crushers are built in 4 sizes with feed openings from 36" x 42" to 48" x 60".

Traylor Type R Jaw Crushers produce up to 550 tons per hour of 9" material year after year with ease. They feature many built-in design improvements to increase plant production and lower production costs. Traylor's original curved jaw plates reduce choking and packing by applying power as a direct crushing force. The improved swing jaw suspension and scientifically reinforced frame of Meehanite metal also combine to assure long, trouble-free service and low maintenance costs. You can see these features illustrated and described in Bulletin 1123. Send for your free copy today.

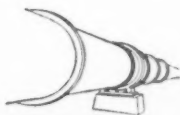
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SALES OFFICES: New York • Chicago • San Francisco  
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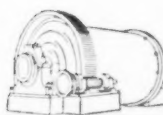
Primary Gyratory Crushers



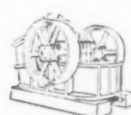
Rotary Kilns



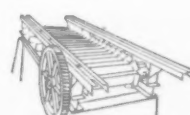
Secondary Gyratory Crushers



Ball Mills



Jaw Crushers



Apron Feeders

# Why V-Belts with CONCAVE SIDES Last Longer!

(U.S. PAT. NO. 1813598)

*Prove this yourself!*



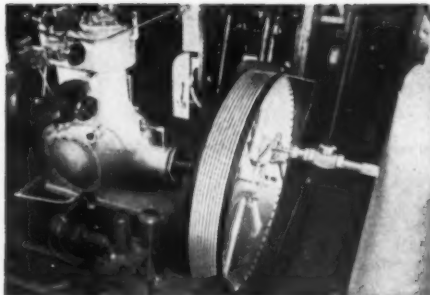
Take any *straight-sided* V-Belt (Fig. 1). Bend it—as it bends in going around a pulley. The sides will at once *bulge out* (Fig. 1-A). Clearly, those bulging sides will press *unevenly* against the V-pulley—and this causes *extra wear* at the points shown by the arrows (Fig. 1-A).

Now bend a Gates Vulco Rope  
with **CONCAVE SIDES** (Fig. 2)



Instead of *bulging*, the precisely engineered **CONCAVE SIDES** merely *fill out to fit exactly* in the sheave groove (Fig. 2-A). The sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the Gates Vulco Rope—and this means *longer belt life* and *lower belt costs* for you!

When you buy V-Belts, be sure to get the V-Belt with the **CONCAVE SIDES**—the Gates Vulco Rope!



Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.



**VULCO ROPE  
DRIVES**

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with the help of*

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Williams gives Gulf lubricants and fuels much of the credit for low maintenance costs and dependability of equipment.

Gulf's quality products and expert engineering service help many companies reduce maintenance

costs and gain a smooth over-all operation.

Why not call your nearest Gulf office now, for complete details on Gulf products and engineering service?

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# AGAIN... IT'S MACK



Complete figures for 1953, compiled by the Automobile Manufacturers Association, show that Mack leads all other manufacturers in sales of diesel-powered trucks and tractors.

There must be reasons—and there are! *Unparalleled fuel economy and reliability* of the Mack Thermodyne® Diesel engine—as revealed by the truly amazing in-service records attested to by important operators all over the country . . . Plus acceptance of the Mack line of heavy-duty trucks, the *only completely new line of trucks* introduced since World War II.

That's why, more and more, the swing is to Mack diesels—for the big savings they give in more miles per gallon, less down-time and stand-out performance.

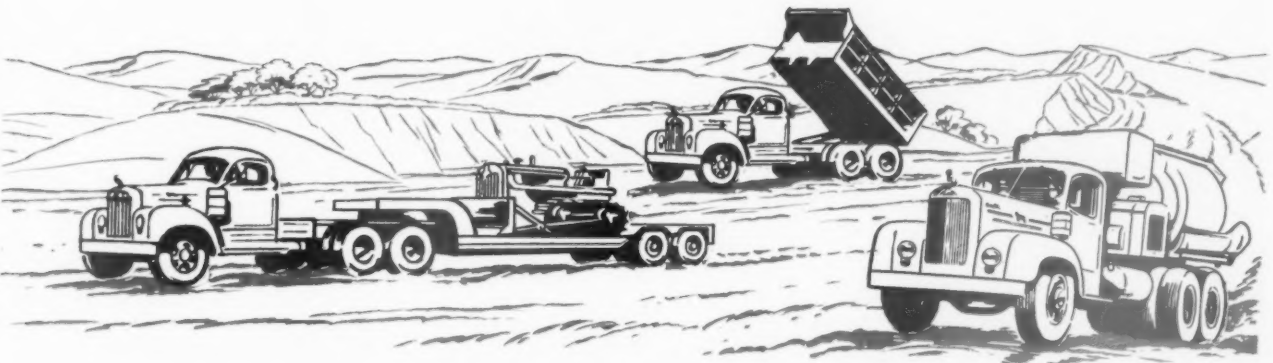
Let us refer you to users of the Mack Thermodyne Diesel whose operating conditions are similar to your own.

## IN DIESEL TRUCK SALES



what Mack Diesels  
are doing for other  
operators...large and  
small...they can do for you

Mack Trucks, Empire State Building, New York 1, N. Y.  
Factory branches and distributors in all principal cities for  
service and parts. In Canada: Mack Trucks of Canada, Ltd.



A black and white photograph of a large lattice-boom crane lifting a clamshell bucket from a deep excavation. The crane's boom extends from the top right towards the center. The bucket is suspended by cables and is positioned over a pile of dirt and debris. The background shows a flat, open landscape under a cloudy sky.

pick up  
bigger  
payloads

with  
"KOEHRING  
WORK  
CAPACITY"

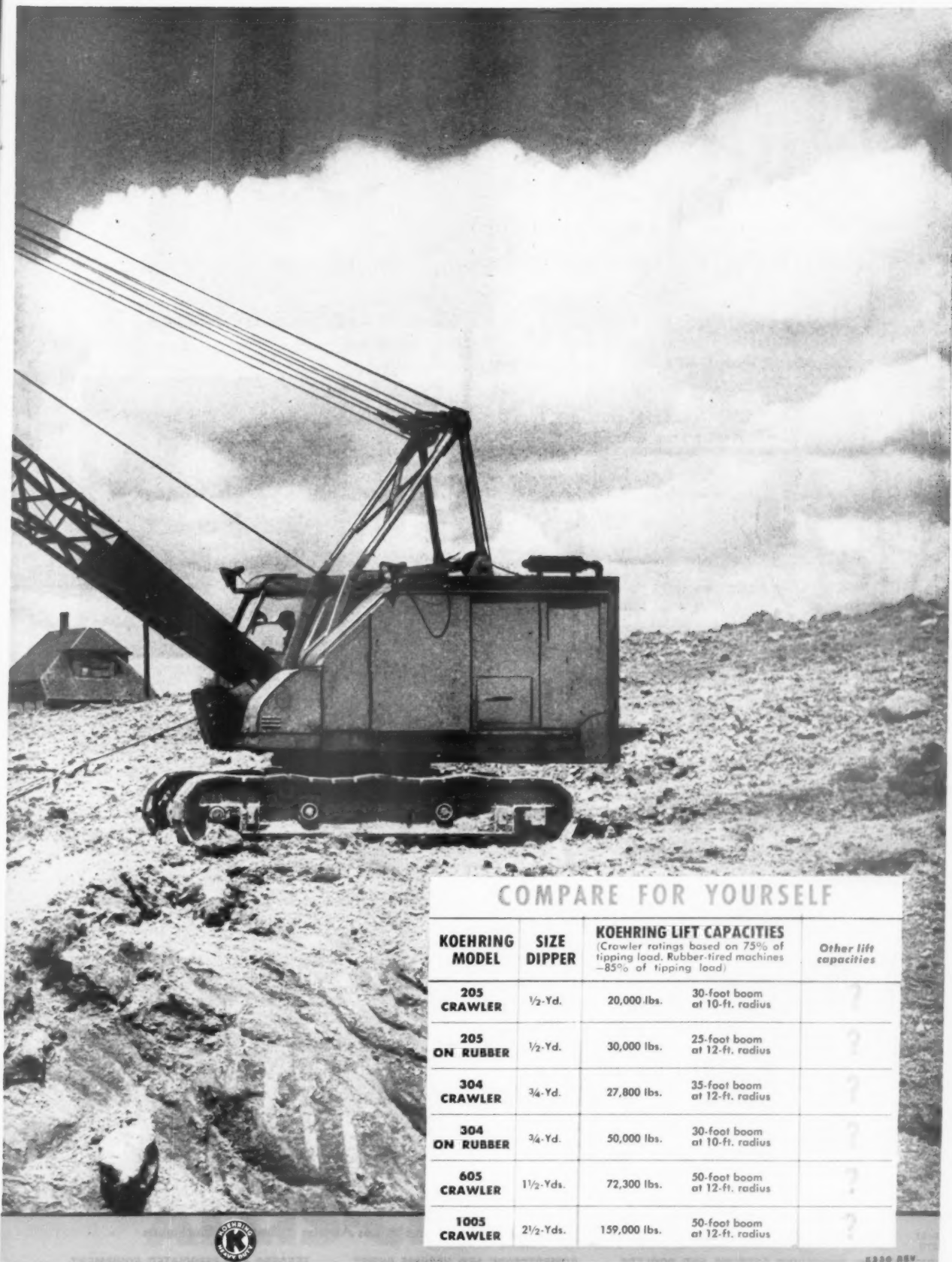
**B**ig payload performance of Koehring cranes and excavators can be measured very quickly. Take a look at lifting capacities, for instance.

Obviously, the machine with the heaviest lift capacity not only picks up larger crane loads, it also has more power and stability to increase shovel or hoe production — handles bigger dragline and clamshell buckets on a wider work range.

Check lift ratings and other clear-cut measurements of "KOEHRING WORK CAPACITY", to insure biggest payload performance on all of your jobs. See Koehring distributor for all the facts.

**KOEHRING COMPANY** Milwaukee 16, Wis.

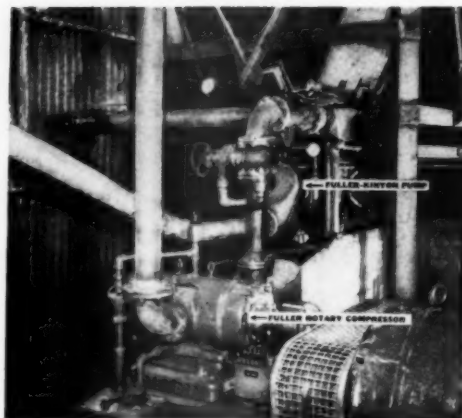
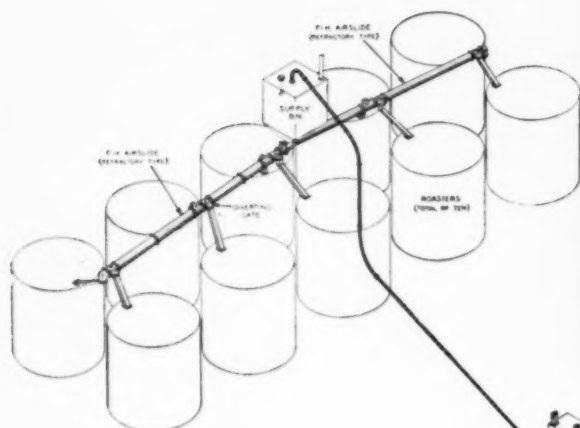
Subsidiaries: JOHNSON  
PARSONS • KWIK-MIX



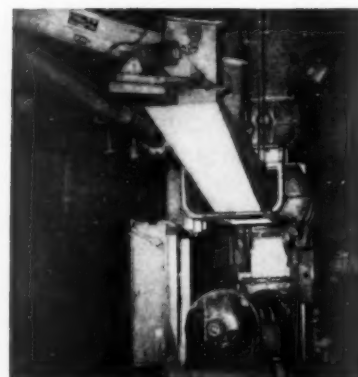
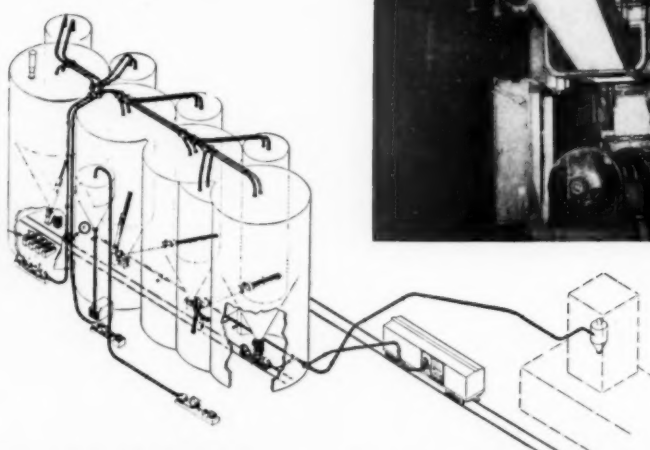
### COMPARE FOR YOURSELF

KOEHRING MODEL	SIZE DIPPER	KOEHRING LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines —85% of tipping load)		Other lift capacities
<b>205 CRAWLER</b>	1/2-Yd.	20,000 lbs.	30-foot boom at 10-ft. radius	?
<b>205 ON RUBBER</b>	1/2-Yd.	30,000 lbs.	25-foot boom at 12-ft. radius	?
<b>304 CRAWLER</b>	3/4-Yd.	27,800 lbs.	35-foot boom at 12-ft. radius	?
<b>304 ON RUBBER</b>	3/4-Yd.	50,000 lbs.	30-foot boom at 10-ft. radius	?
<b>605 CRAWLER</b>	1 1/2-Yds.	72,300 lbs.	50-foot boom at 12-ft. radius	?
<b>1005 CRAWLER</b>	2 1/2-Yds.	159,000 lbs.	50-foot boom at 12-ft. radius	?





**Hot  
or  
COLD**



flue dust or talc  
convey it with

**FULLER-KINYON & F-H AIRSLIDE®**  
CONVEYING SYSTEM

**Fuller**  
CONVEYS BY

CLEAN...SAFE...EFFICIENT

Many conveying problems, heretofore considered impossible and impractical from an economic standpoint, are today being solved by the use of Fuller-Kinyon and F-H Airslide Conveyors, either individually or in combination. Illustrated are two installations, each made practical and economical by the combination of these two systems . . . advanced designing and know-how by Fuller engineers experienced in the art of air-conveying for over a quarter of a century. Installation, upper left, conveying hot flue dust. A Fuller-Kinyon Pump conveys from a precipitator to a supply bin. From the supply bin, F-H Airslides convey and control the distribution of the flue dust to roasters, with no dust or loss of material. Material handled has

a temperature up to 800 deg. fahr. The pump conveys at rate of 25 tons an hour over a distance of approximately 220 feet. Drawing, lower right, talc conveying. Fuller-Kinyon Systems convey from pulverizers to storage silos and bins, and from storage to packer bin or bulk-car loading. F-H Airslides convey from flat-bottom storage bins to the Fuller-Kinyon Portable Pump illustrated above drawing. When it's conveying you need, you need a Fuller engineer to make a study of your requirements. His findings may result in advanced and practical ideas you never anticipated or thought possible. Write for literature on Fuller-Kinyon and Airslide Conveyors.

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G-91  
2278

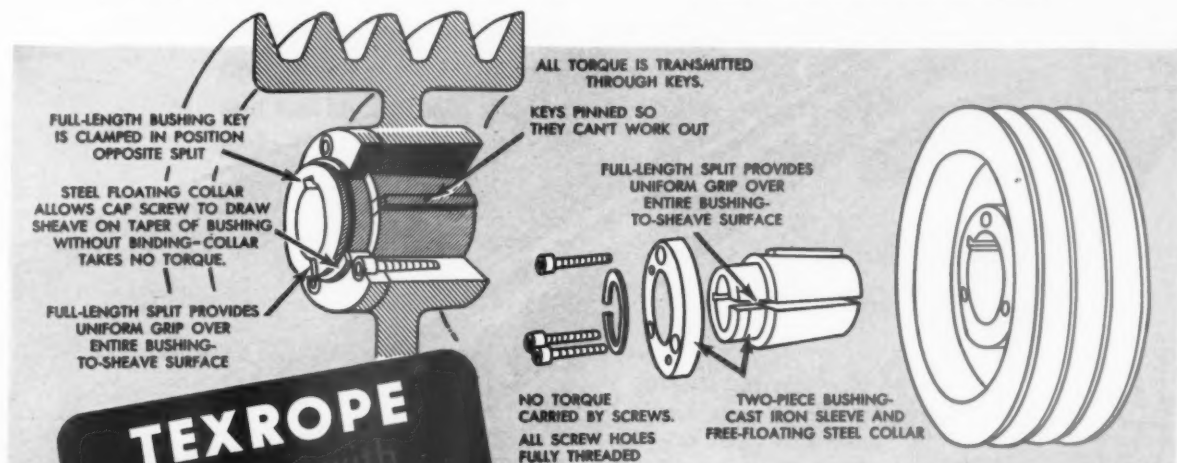
DRY MATERIAL CONVEYING SYSTEMS AND COOLERS . . . COMPRESSORS AND VACUUM PUMPS . . . FEEDERS AND ASSOCIATED EQUIPMENT

# WHEN YOU BUY SHEAVES... Get All These Features!

**ALL SHEAVES ARE NOT ALIKE. ONLY *Magic-Grip* SHEAVES COMBINE ALL THESE IMPORTANT FEATURES:**

- 1** Full-length contact between bushing and shaft. Bushing is slit full length instead of part way. Result — when tapered bushing is slid into tapered sheave bore, pressure is applied equally all around bushing along full length. Sheave can't get out of alignment or develop excessive runout.
- 2** Full-key drive — Torque between bushing and shaft, and between bushing and sheave is transmitted by keys instead of threaded screws. Jamming of screws from shock overloads eliminated.
- 3** One-piece mounting — *Magic-Grip* sheave installs as a unit instead of in two pieces. Simply slip sheave on shaft and tighten cap screws. Complete sheave can be moved back and forth on shaft to adjust position.
- 4** Full-threaded screws — Cap screws in *Magic-Grip* sheaves engage a full thread — instead of a partial thread. Stripping and jamming problems eliminated!

Texrope and Magic-Grip are Allis-Chalmers trademarks.



**Here's Comparison of Magic-Grip Sheave and Other Sheaves**

	<i>Magic-Grip</i> Sheaves	SHEAVE A	SHEAVE B	SHEAVE C
Bushing fully split for uniform clamping action.	Yes	Yes	No	Yes
Load carried by keys instead of threaded bolts.	Yes	No	No	No
Bushings cover full range of NEMA "probable" shaft diameters.	Yes	Yes	Yes	No
All screws engage full thread.	Yes	Yes	Yes	No
Mounts in one piece.	Yes	No	Yes	Yes
Squares itself with shaft.	Yes	No	No	No

All Allis-Chalmers sheaves available with *Magic-Grip* bushing.

Get more information on the fastest mounting sheave on the market. Call your nearby A-C distributor or district office. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

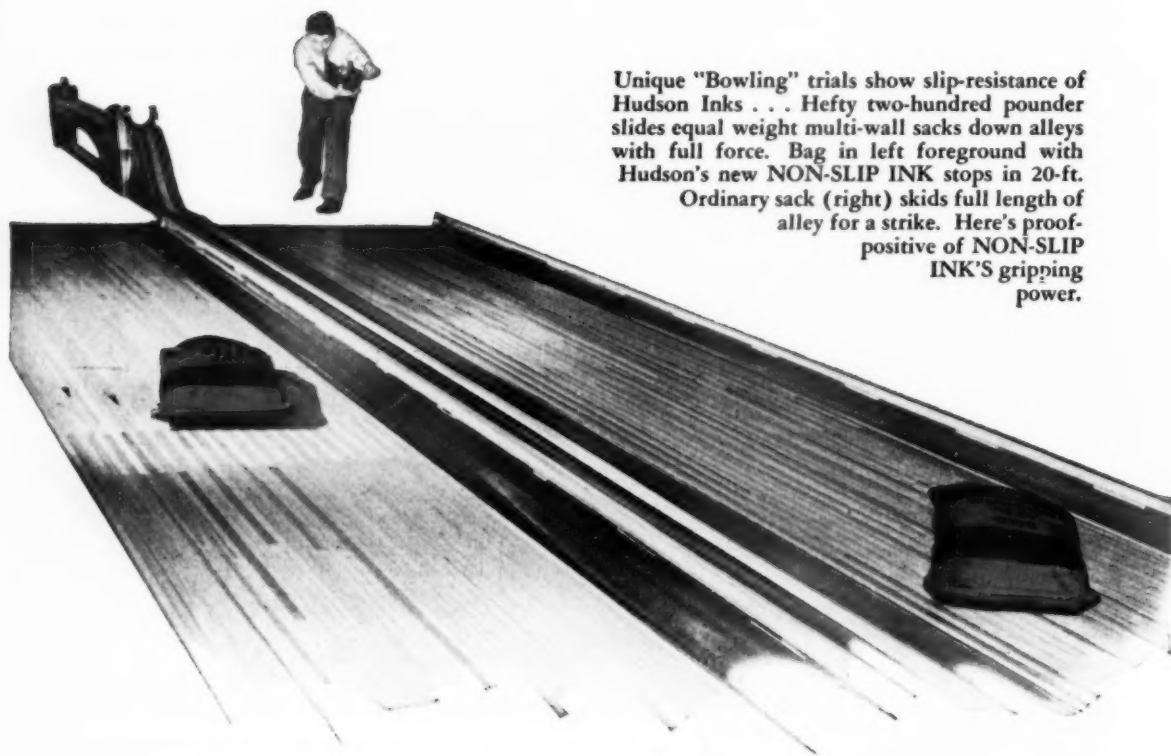
A-4278

## ALLIS-CHALMERS

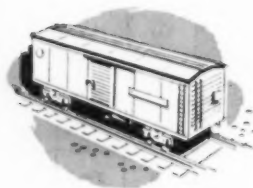


# STOP BAG SLIPPING WITH...

# Hudson's New



Unique "Bowling" trials show slip-resistance of Hudson Inks . . . Hefty two-hundred pounder slides equal weight multi-wall sacks down alleys with full force. Bag in left foreground with Hudson's new NON-SLIP INK stops in 20-ft. Ordinary sack (right) skids full length of alley for a strike. Here's proof-positive of NON-SLIP INK'S gripping power.



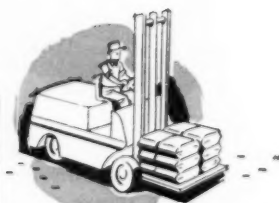
We humped a freight with half a carload . . . not a single Hudson Non-Slip Ink sack slid or broke!



Do you ship by truck? Buy Hudson Bags with Non-Slip Ink and watch your "Slip-break" losses shrink!



Non-Slip Ink puts an end to sacks sliding under their own weight and falling apart like a house of cards!



Sudden stops no longer mean sudden losses from bags that slip, slide and break!

# *Non-Slip Ink!*

## **...at no extra cost!**

### **Takes Skid Out of Your Bags!**

Again Hudson puts your shipping problems "in the bag" for you ... with this exclusive, specially developed NON-SLIP ink.

What's more, there's NO EXTRA charge for this ink! Stack this up with all the other superior features of Hudson multi-wall sacks and you know you're buying the best bags money can buy when you make the order out to *Hudson!*

### *Here's Why:*

**Best Protection** — cuts package loss caused by slipping — Takes rough handling in transit! Hudson strongest by far!

**Less Re-Handling** — because slipping in packing and storage is virtually eliminated — No double handling.

**Free Moving** — designed for perfect handling on chutes and conveyors.

**Labor Savings** — easier and faster to handle — No fumbling with Hudson's "Sure-Grip Multiwalls."

*Send for complete story today!*



HUDSON PULP AND PAPER CORP.  
Dept. RP-4-A, 505 Park Avenue  
New York 22, New York

Yes! We'd like the whole story on Hudson's new  
NON-SLIP INK.

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

# Have you a dust recovery problem?

Bring it to

## WESTERN PRECIPITATION

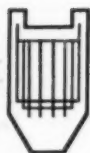
... The Only Organization With Years Of "Know-How" In BOTH Electrical And Mechanical Recovery Methods!

If you have any kind of a suspension-recovery problem—whether dust, fly ash, fume, fog or mists—it will pay you to bring it to the leading organization in the field . . . WESTERN PRECIPITATION CORPORATION. Western Precipitation not only pioneered, over 44 years ago, the first commercial application of the now-famous COTTRELL Electrical Precipitators, but also has been a leader for many years in the mechanical recovery field with its widely-accepted MULTICLONE Collectors.

### Result:

Western Precipitation is unsurpassed in the all-important factor of "know-how" in BOTH the electrical and mechanical fields . . . knows from years of first-hand experience whether your particular problem can best be solved by mechanical or electrical methods—or by a combination of the two . . . can give you a direct and unbiased recommendation on the matter . . . and then can provide the complete installation under one responsibility, one overall performance guarantee, even where Combination Multiclone-Precipitator (CMP) installations are made!

Western Precipitation products and services include . . .



### COTTRELL

#### Electrical Precipitators

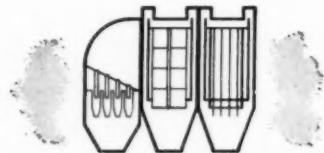
... the most efficient recovery equipment for high recovery, long life, low maintenance on practically any type of suspensions, wet or dry. COTTRELLS can be designed to handle a few c.f.m.—or millions—with equal ease, and at virtually any operating temperature. Recovery efficiencies closely approach 100% recovery, if desired, with very low draft loss, minimum power costs and negligible labor costs. By all standards, Western Precipitation COTTRELLS give highest recovery at lowest cost per-year-of-service!



### MULTICLONE

#### Mechanical Collectors

... the most efficient, most compact, most trouble-free mechanical equipment for recovering suspensions from gases. Because of their unique small-tube design, MULTICLONES are unsurpassed in mechanical recovery efficiencies—require less space, less maintenance, and are far simpler to install. No filters or screens to replace, nothing to burn or cause fire hazards, no high speed moving parts to repair or replace. These and many other advantages make MULTICLONE Collectors the logical choice on installations where mechanical recovery is selected.



### CMP UNITS

#### (Combination Multiclone-Precipitator)

... combine, in one compact installation, both mechanical and electrical recovery principles so that maximum benefit is obtained from the advantages inherent in each method. The MULTICLONE section centrifugally removes the larger and heavier suspensions (down to a few microns in diameter) . . . and the COTTRELL section then electrically removes the very small particles remaining in the gases. Thus, the bulk of the recovery is obtained with relatively low-cost equipment, and the final clean-up is obtained with equipment having unusually high recovery efficiency—approaching theoretically perfect, if desired.

The recovery of suspensions from gases is a highly exact science and every problem is different. Some require mechanical methods—others electrical methods—still others a combination of mechanical and electrical methods in proper balance to meet the individual requirements of each application. No matter what your problem, remember that only Western Precipitation has had years of field experience in BOTH mechanical and electrical methods!

Let our experienced engineers study your recovery requirements and make an unbiased recommendation on the equipment best suited to your particular problem. A wire, phone call or letter to our nearest office places this unique "know-how" at your service, without obligation.

Send for descriptive literature!

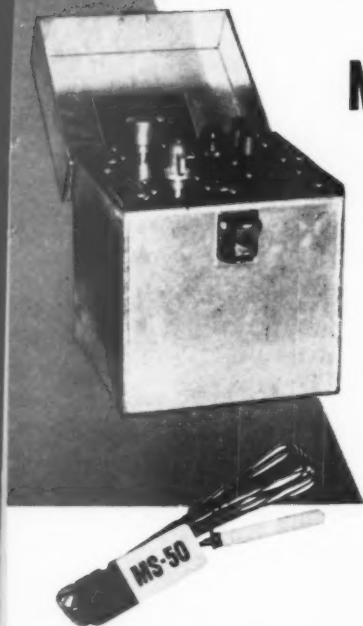


**WESTERN  
Precipitation  
CORPORATION**

DESIGNERS AND MANUFACTURERS OF EQUIPMENT FOR  
COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices 1006 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA  
CHRYSLER BLDG., NEW YORK 17 • 1 N. La SALLE ST. BLDG., CHICAGO 2  
1429 PEACHTREE ST. N.E., ATLANTA 5 • HOBART BLDG., SAN FRANCISCO 4  
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

MULTICLONE—T.M. Reg.



# Midwest Limestone Quarry Saves Money by SWITCHING TO DU PONT IRON WIRE MS DELAY CAPS EXCLUSIVELY

## Du Pont CD\* Blasting Machine Furnishes Ample Firing Power

The use of a Du Pont CD Blasting Machine for firing multiple-hole wagon drill blasts enables the Kaser Construction Co.'s Red Oak Quarry, Montgomery County, Iowa, to realize a substantial saving by replacing the usual copper wire blasting caps with the more economical iron wire variety. Typical shot (below) was made with this dependable, economical Du Pont blasting "team."



**1. PRIOR TO BLAST.** Operators loading charges of Du Pont Red Cross Extra 50% into wagon drill holes. Quarry face averages 10' in height, hole spacings 8' x 8'. Holes were primed with economical iron wire MS Delay Electric Blasting Caps. The shot of 125 holes was connected in parallel series and fired with Du Pont CD-32 blasting machine.



**2. CD-32 BLASTING MACHINE** readied for firing. Terminals of the unit are dead until switch is thrown. Power cannot reach blasting circuits except by deliberate action of operator. And this 22-lb. machine provides ample power to fire iron wire shots of this size and larger, dependably and consistently, day after day.



**3. EXCELLENT BREAKAGE** allows quick removal of rock. CD Blasting Machine not only allowed the use of more economical iron wire electric blasting caps, it also eliminated the expensive-to-maintain permanent shooting power lines. These lightweight, sturdy, powerful blasting machines are available in four sizes . . . there is one that will satisfy any size operation.

\*Condenser Discharge

Why not introduce this more economical method of blasting in your own quarry? It's a blasting "team" that's helping boost profits in many quarry operations. Ask the Du Pont Explosives Representative in your district for complete information about using economical Du Pont Iron Wire Caps with the CD Blasting Machine. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

## DU PONT EXPLOSIVES

*Blasting Supplies and Accessories*



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

# They're licked before they start

Super-Tempered Precision Space Screens defy Abrasion, Vibration and Fatigue to do their worst. These durable screens stay tight and give extra long wear on the most punishing jobs because they're made of hard and tough super-tempered steel wire that's precision crimped and woven on powerful hydraulic machines.

Specify Super-Tempered Precision Space Screens and find out how they save you money in less downtime and longer life; greater tonnage output at lower cost. To order, write or phone our nearest sales office:

WICKWIRE SPENCER STEEL DIVISION, Atlanta • Boston • Buffalo  
Chicago • Detroit • New Orleans • New York • Philadelphia  
THE COLORADO FUEL AND IRON CORPORATION, Denver, Colorado  
PACIFIC COAST DIVISION, Oakland, California

**SUPER-TEMPERED**  
**PRECISION SPACE SCREENS**   
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION  
THE COLORADO FUEL AND IRON CORPORATION



# now—

## a 4-WHEEL DRIVE

**Excavator-Loader with**

*plus* **features for**  
*plus* **performance**

# TRACTOMOTIVE

# TL-12

# TRACTO-LOADER

Weight: 12,000 lb.

Bucket Capacity: 1 cu. yd.

Speeds — 4 forward, to 20 mph . . . 4 reverse, to 25 mph

Brake Hp. — 63



MODEL TL-10 for all types of bulk material handling . . . with short, 11-ft. turning radius, torque converter drive, clutch-type transmission and Allis-Chalmers POWER-CRATER engine,  $\frac{3}{4}$  cu. yd. bucket, weight 11,400 lb., 63 brake hp.

See your nearest Allis-Chalmers  
Industrial Tractor Dealer

**4-WHEEL DRIVE** for excellent traction — excavating or loading — even under adverse ground conditions . . .

**PLUS HYDRAULIC TORQUE CONVERTER DRIVE** for smoother, faster operation. No ramming or clutching, no engine stalling . . . easier maneuvering, snappy bucket action!

**PLUS CLUTCH-TYPE TRANSMISSION** Eliminates most shifting. Operator simply pushes a lever to go forward, pulls it back for reverse. He can work all day without shifting gears on short-haul jobs!

**PLUS REAR-WHEEL POWER STEERING** This advantage together with all-wheel drive means easy steering and maneuvering under all operating conditions.

**PLUS NEW, DYNAMIC ALLIS-CHALMERS POWER-CRATER ENGINE** Gives you high-octane performance on regular gasoline.

Yes, here's 4-wheel drive PLUS . . . PLUS all the advantages Tractomotive offers you in its famous TL-10 Tracto-Loader — the outstanding performer on bulk material handling. Choose the model that fits your needs.

**Wire, write or call for a demonstration NOW!**

POWER-CRATER is an  
Allis-Chalmers trademark



# TRACTOMOTIVE

TRACTOMOTIVE CORPORATION, DEERFIELD, ILLINOIS

Tracto-Loaders • Tracto-Shovels, Side Booms and Hydraulic Rippers  
for Allis-Chalmers Crawler Tractors • Loader and Shoulder  
Maintainer for Allis-Chalmers "D" Motor Grader

**ROLLWAY**  
**Tru-Rol**  
**ROLLER BEARINGS**

**The Right Balance Between  
Precision and Economy**

Rollway's Tru-Rol Cylindrical Roller Bearings fill a well-defined need . . . afford the design engineer much wider latitude in balancing performance and reasonable cost.

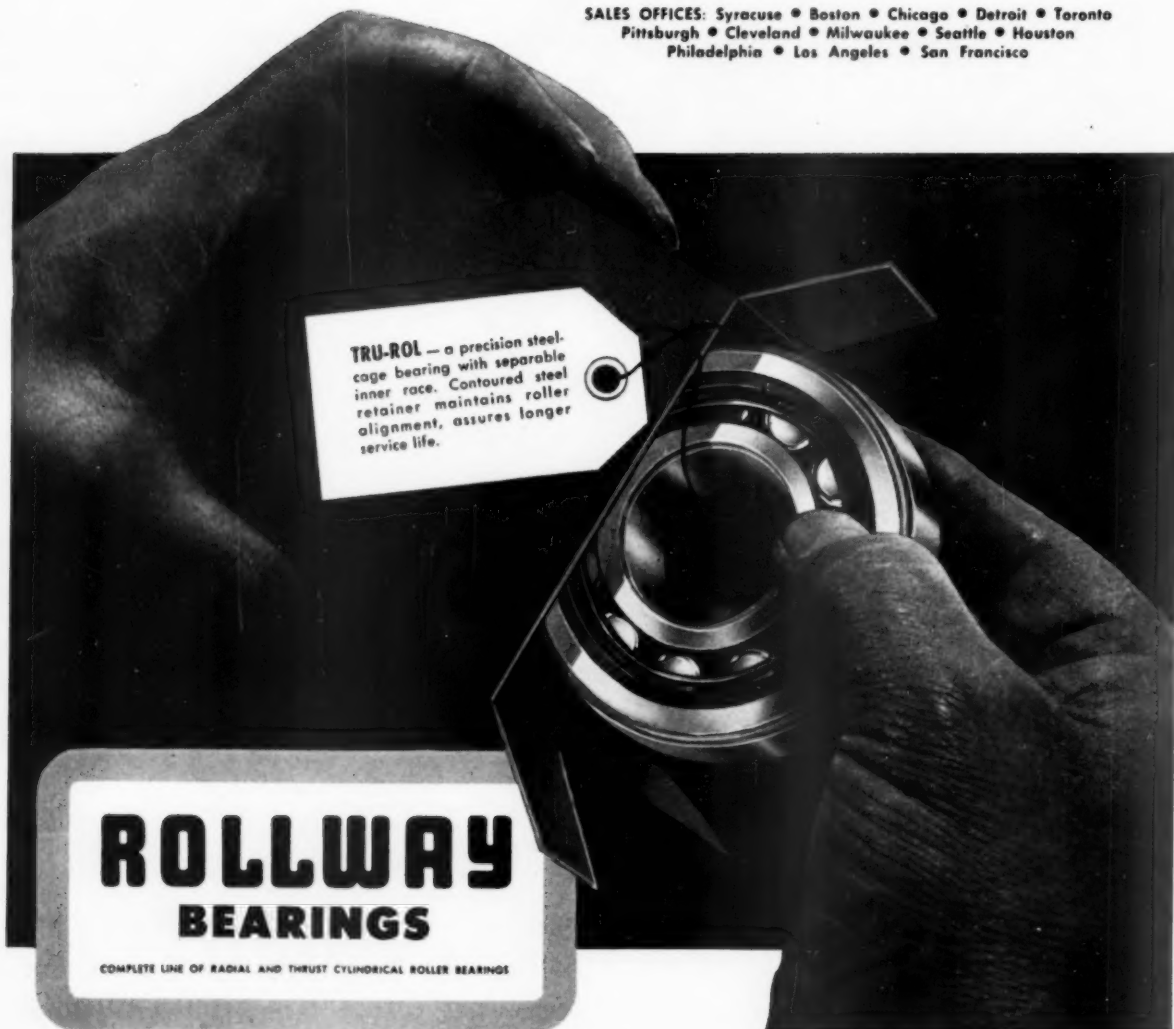
A steel-cage bearing in the steel-cage cost range, Tru-Rol boasts true and precise rolling approaching that of bronze-separator types. That's because of the exclusive Rollway guide-lip . . . an ingenious, low-cost feature that prevents roller-skewing, sliding friction and excessive wear. Investigate Tru-Rol's outstanding record before you specify bearings in the medium price range.

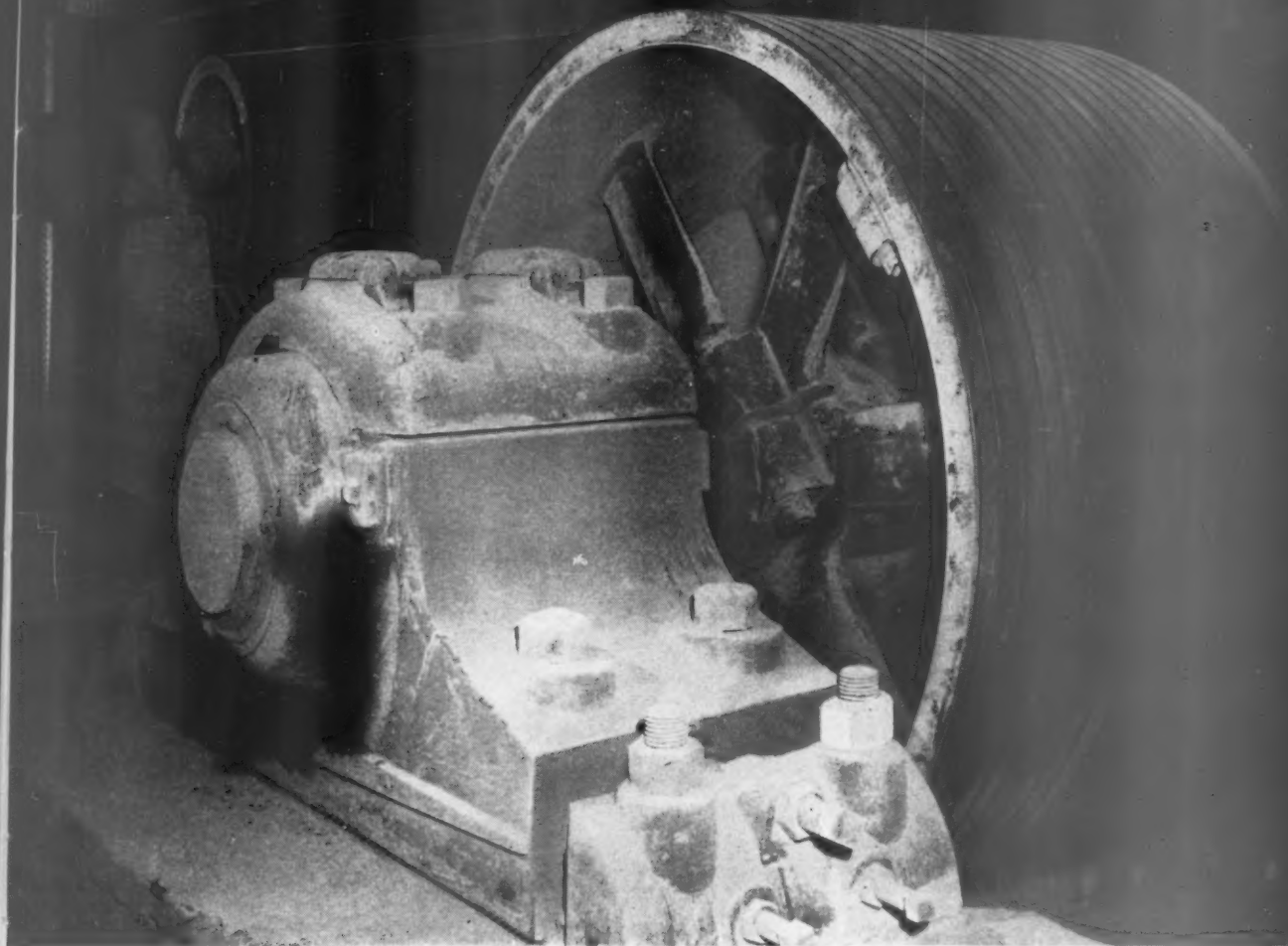
Our complete engineering and metallurgical services will gladly work with you on your problem. Simply write or wire any sales office. No cost. No obligation.

Rollway Bearing replacements are available through authorized distributors in principal cities. Consult your classified phone directory.

**ROLLWAY BEARING CO., INC.**  
**SYRACUSE, N. Y.**

**SALES OFFICES:** Syracuse • Boston • Chicago • Detroit • Toronto  
Pittsburgh • Cleveland • Milwaukee • Seattle • Houston  
Philadelphia • Los Angeles • San Francisco





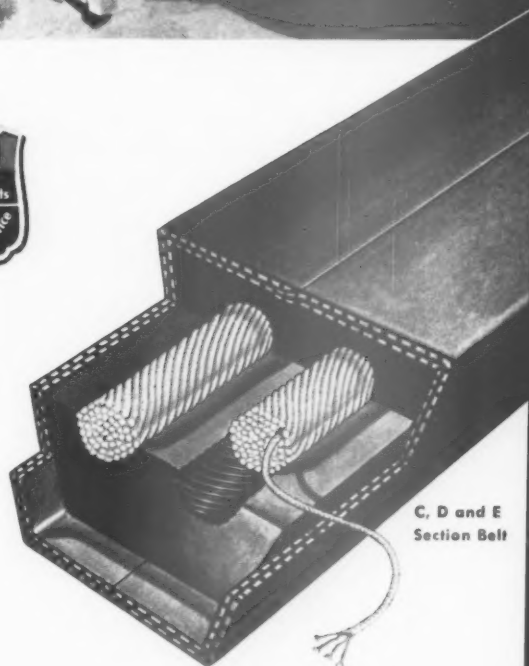
## Thermoid Multi-V Belts cut operating costs in quarries



There's a Thermoid V-Belt for every pit or quarry application. Each belt is *pre-stretched* to provide longer service and *maximum power transmission* without slippage.

Thermoid C, D and E section belts are of rayon grommet-type construction to provide brute strength and extra flexibility that withstands repeated shock loads. The entire belt is vulcanized into a solid unit that withstands moisture, abrasion, internal friction and heat.

Get longer wear with less maintenance . . . lower your operating costs with Thermoid Multi-V Belts. Your Thermoid Distributor can give you complete information on the Belts best suited for your requirements. Or if you prefer, write direct for Catalog 3787.



C, D and E  
Section Belt

# Thermoid

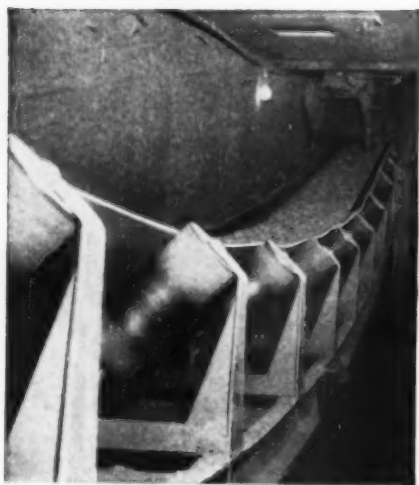
Conveyor & Elevator Belting • Transmission Belting  
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Rubber Sheet Packings • Molded Products  
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah



*Stockbridge Stone Co. finds that* **Extra flexibility of belt reinforced with "Cordura" permits 45° idlers . . . speeds production**



Reinforced with Du Pont "Cordura", this 527 ft. long, 30 in. wide belt operates almost constantly during an eight-hour, six-day working week. Although subject to dampness, cold and dust, it has been in service for six months with no maintenance.

To increase loading capacity . . . cut loading time . . . speed production, the Stockbridge Stone Co. of Georgia installed a main conveyor belt operating on 45° troughing idlers. Reinforcement with Du Pont Cordura\* gives this belt extra strength . . . plus extreme lateral flexibility required by the unusual troughing angle. Operators of the quarry report that the belt—manufactured by Raybestos-Manhattan, Inc.—shows no sign of wear after 6 months of operation.

Belts sinewed for strength with "Cordura" trough and train better. And the extra strength and low stretch of "Cordura" means less downtime for take-ups, resplicing. Loaded or empty, these belts ride firmly on the center idler.

Find out more about the advantages of belts reinforced with Du Pont "Cordura". Write for names of suppliers, and for your copy of the free booklet: "Sinews for Industry." Address: Textile Fibers Dept., Room 2520-R, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

\*REG. U. S. PAT. OFF.

Du Pont *"Cordura"* High Tenacity Rayon  
STRENGTH AT LOW COST

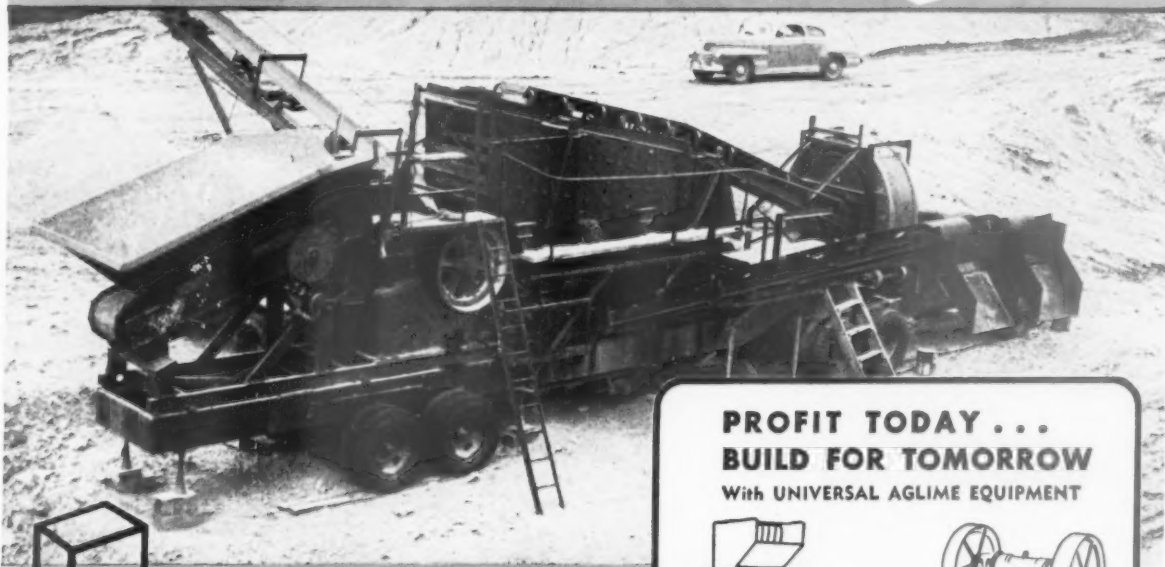


BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

# UNIVERSAL

## COMPLETE PACKAGE UNITS

### FOR PROFITABLE AGLIME PRODUCTION



**THE UNIVERSAL 293QH LIMEROK  
A COMPLETE QUARRY PLANT IN ONE PACKAGE**

Here's high portability, extreme flexibility, and profit-making capacity that lets you produce aglime in volume near your market, or shift to road rock when the season changes. The Universal 293QH Limerok is engineered for top output and economy with high capacity jaw crusher primary, hammermill secondary and gyrating screen mounted on a single chassis. It loads direct from quarry and produces aglime, road rock and chips simultaneously or separately. Delivers finished material to trucks or stockpiles. A smooth operating, proved profit-maker.



**THE UNIVERSAL 546P  
PORTABLE PRIMARY  
CRUSHING UNIT**



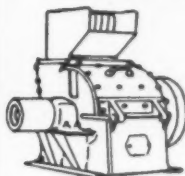
**THE UNIVERSAL 1800 SERIES  
PORTABLE HAMMERMILL  
SECONDARY CRUSHING UNIT**

The 546P Primary and 1800 Secondary, available in various sizes, make possible the selection of a balanced combination to meet a wide range of production requirements.

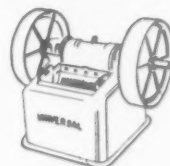
Portable or stationary—whatever your requirements for producing essential aglime UNIVERSAL builds the combination you need for more tons per hour at lowest cost per ton. Contact your Universal distributor for complete information or write direct.

#### PROFIT TODAY... BUILD FOR TOMORROW

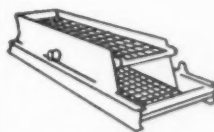
With UNIVERSAL AGLIME EQUIPMENT



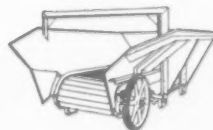
Hammermills



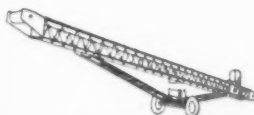
Jaw Crushers



Aglime Screens



Apron Feeders



Aglime Conveyors



Aglime Bins

**UNIVERSAL ENGINEERING CORPORATION** Subsidiary of **PETTIBONE MULLIKEN CORPORATION**

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Phone 7105

4700 West Division St., Chicago 51, Illinois  
Phone Spaulding 2-9300





SINCE 1852  
**OSGOOD-GENERAL**  
 CRANES AND  
 EXCAVATORS

## Some Breeds Dig Better

It takes years . . . of hard work, practical experience and painstaking effort to develop a thoroughbred "breed" . . . but the results are worth it! When you call on a thoroughbred he gives you all the power, speed and stamina in him, without urging.

For over a hundred years . . . since 1852 OSGOOD has been developing and improving a thoroughbred "line" of power cranes and excavators, studying the requirements of various type jobs and engineering new machines or improvements to fulfill these needs. OSGOOD-GENERAL machines will respond with a steady smoothness to an operator's demand . . . and they are rugged, with plenty of stamina for long continuous service.



9475

Power Shovels • Hoes • Cranes • Drag-Clams • Piledrivers • 1/2-3 yds. • 10-63 Tons



# OSGOOD GENERAL

MARION, OHIO

OVER 100 YEARS OF ENGINEERING PROGRESS

# Eaton 2-Speed Truck Axles



POWER WHEN NEEDED, SPEED WHEN WANTED

MORE AND QUICKER FULL-LOAD TRIPS

LOWER OPERATING AND MAINTENANCE COSTS



More than two million  
Eaton Axles in trucks today!  
For complete information, see your truck dealer.

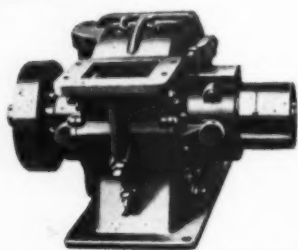
## EATON

AXLE DIVISION  
MANUFACTURING COMPANY  
CLEVELAND, OHIO



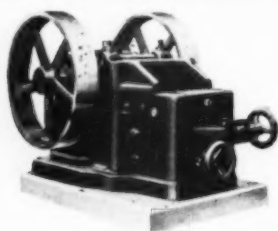
**PRODUCTS:** Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

# STURTEVANT



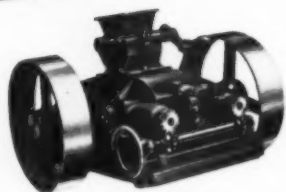
**LABORATORY SWING-SLEDGE MILLS**

Capable of reducing soft, moderately hard and tough or fibrous materials to any degree of fineness between 1 in. and 20 mesh. The patented "Open-Door" feature permits ready accessibility for cleaning.



**LABORATORY JAW CRUSHERS**

Special Roll Jaw action simplifies close regulation of the product with capacities varying from 300 to 400 lbs. per hour at finest settings, to 1000 or 2000 lbs. when opened for coarser work. Each part of the crusher is accessible for quick and easy cleaning.



**LABORATORY CRUSHING ROLLS**

First designed especially for laboratory sampling work, Sturtevant Crushing Rolls are used regularly in many plants where there are limited out-puts. Range of output for the 8 x 5 size is from  $\frac{1}{2}$  in. to 20 mesh — and for the 12 x 12 size from  $\frac{3}{4}$  in. to 20 mesh.

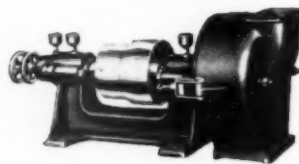
## **Laboratory Equipment...**

**assures accurate samples... cuts laboratory sampling costs**

Sturtevant laboratory equipment have all the features of full-sized production machines with extra accuracy and wider range of adjustment built-in. They are fast... provide true samples of every batch processed.

All Sturtevant machines have "open-door" accessibility which permits quick, thorough cleaning... prevents the possibility of previous batches from contaminating new samples. Their rugged construction assures round the clock operation with practically no maintenance.

Investigate Sturtevant equipment for your laboratories. They will help you cut sampling costs... improve product quality... increase sales. Write for catalog, today.



**LABORATORY SAMPLE GRINDER**

Laboratory Sample Grinders are of the "Open-Door" disc type and are capable of very fine work, producing products as fine as 100 mesh (coarser if desired) when working on dry, friable, soft or moderately hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.

## **STURTEVANT MILL COMPANY**

102 Clayton Street, Boston 22, Mass.

*Designers and Manufacturers of*

CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

# NOW!

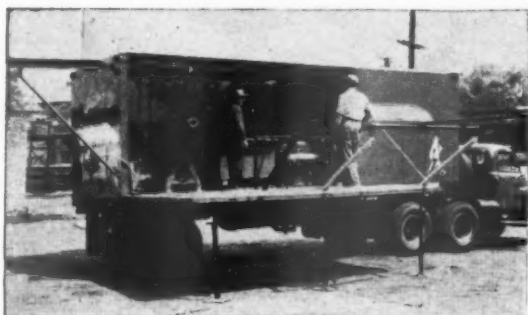
you can get  
big drill performance  
with the

## CHALLENGER Blast Hole Drill

### HERE'S WHAT USERS SAY:

"Drilling cost per ton of ore broken reduced by two-thirds over wagon drills. Driller experience can further reduce to one-sixth of wagon drilling cost."

"Punched down four 60' holes, bottoming at 4" dia., in one shift. What a drill!"



### SPECIAL DRILL AND STEEL SERVICE

The size of the Challenger Drill and the sectional steel used with it, makes necessary special drill and steel service which is provided by Joy. Service trucks, like the one shown here, make periodic visits in areas where Challenger Drills are operating. The operators of this "mobile shop" are experienced drill doctors who furnish complete drill steel service, bit sharpening service, drill inspection, and suggestions for use and application of the drill for best results.

*Consult a Joy Engineer*



W&C 4876



MOUNTS THE  
LARGEST HAMMER DRILL  
YET DESIGNED

ANOTHER  
JOY "FIRST"

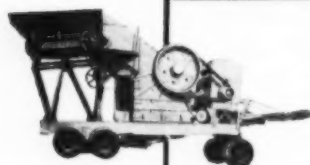
Users' reports on early units show that you really get big drill performance with the Challenger Drill. It's a 5¼" hammer drill (not a piston drill) that drills 4½" diameter holes through hardest rock to depths of 50' or more. This big drill performance calls for a 26' feed to cut the number of steel changes, and a self-propelled mounting. Tractor-mounted on rubber tires with a portable compressor to furnish air for drilling, the Joy Challenger is the biggest cost-cutting big drill for hard rock drilling. Check your needs... see if this big drill won't answer your problems. • Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.

# JOY

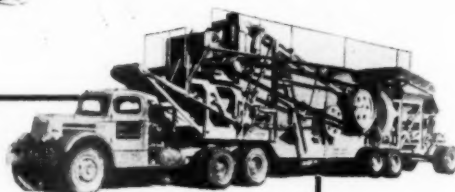
WORLD'S LARGEST BUILDER OF  
CORE DRILLS, ROTARY BLAST HOLE DRILLS  
AND MOTORIZED DRILL RIGS



**TWO  
GREAT NAMES  
NOW BEHIND  
DIAMOND EQUIPMENT  
and SERVICES**



To the scores of satisfied users of Diamond products, and to future Diamond customers, it is a pleasure to announce that the Diamond Iron Works line of crushing, screening, washing, and conveying equipment for rock, gravel, aggregate, and corporate aggregates has been acquired by Goodman Manufacturing Company, Chicago.



Goodman, 54 years a leading designer and manufacturer of heavy equipment for underground mining and tunnelling, will contribute advantages inherent in a large organization of sound reputation and technical skill.

Manufacturing, as well as Diamond's sales and engineering departments, have been transferred from Minneapolis to the Goodman plant in Chicago. Now that larger and better facilities are available, Diamond users can expect such benefits as improved service—better-than-ever Diamond products.

Experienced engineering and sales counsel will be maintained by Diamond veterans. An established Diamond distributor—there are more than fifty located throughout the country—will continue to serve you. Your call upon any of our services will be promptly cared for.



**DIAMOND IRON WORKS**

division GOODMAN MANUFACTURING COMPANY

Halsted Street and 48th Place • Chicago 9, Illinois



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**to better your best production!**

Pit a P&H 1055 against any comparable 3½ yd. machine and see how P&H takes over the production lead. And it *maintains* the pace day after day, under the toughest digging and loading conditions!

P&H years-ahead design and construction make the big difference. You get the extra strength of high-tensile alloy steels to withstand the pounding of repeated shock loads . . . the solid stability that lets you exert more power at tooth point. And only P&H has *Magnetorque* to swing you through five loads to the other man's four. It's the most dependable swing ever built — lasts the life of the machine!

Want the same outstanding features in a 2½ yd. machine? Ask us about the companion Model 955A.

with **P&H** **MAGNETORQUE\***  
ELECTRIC SWING

- 15-25% faster . . . . .
- 100% free of friction and wear!

\*T.M. of Harnischfeger Corporation  
for electro-magnetic type coupling.

**P&H** LARGE EXCAVATOR DIVISION  
**HARNISCHFEGER**  
CORPORATION  
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the **P&H** Line



TRUCK CRANES



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WET OR DRY GRINDING

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# WHAT'S HAPPENING

## In Other Fields of Interest to Rock Products Industry

April, 1954

Heavy construction awards, nationally, totaled \$1,741,069,000 for the first nine weeks of 1954, which was a 40 percent decrease from the \$2,909,541,000 for the same period of 1953, as reported by Engineering News-Record. The year's slow start was attributed to a lag in public works and to a temporary dearth of extraordinarily large projects, in contrast to the 1953 period when there were several unusually large projects. State and municipal awards amounted to \$663,000,000 for the 1954 period, which was 12 percent under the record volume in 1953. Federal awards of \$168,000,000 and private awards of \$911,000,000 were down 49 percent and 50 percent, respectively.

\*\*\*\*\*

The lake formed by gravel operations of Decatur Sand and Gravel Co., Decatur, Ill., may serve as an emergency source of water for the city. The steady fall of Lake Decatur, the city's normal water source, which is now 4 ft. below the top of the dam, and a predicted drouth for next fall, prompted the city to investigate possible emergency supply sources. The lake formed by the gravel operation covers about 20 acres and contains an estimated 25,000,000 gal. of water. The owners of the company confirmed that tests have indicated a possible rate of 2,000,000 gal. a day, and that, in case of emergency, about 1,600,000 gal. per day could be made available to the city and still leave enough water to maintain dredging operations. The lake is spring-fed, but tests show the mineral content to be about the same as that of Lake Decatur. Water would be pumped directly from the lake, without sinking wells.

\*\*\*\*\*

Construction contract awards, in the 37 states east of the Rockies, set an all-time high for the 1954, January-February figures, being 9 percent ahead of the previous high set in 1951, and 13 percent greater than the first two months for 1953, according to an F. W. Dodge Corp. report. Non-residential awards totaled \$941,789,000 for the first two months of 1954, which was a 21 percent increase over the corresponding 1953 period; residential awards of \$971,255,000 were up 11 percent; and heavy engineering awards of \$460,203,000 were up 5 percent. Awards for the month of February, totaling \$1,221,260,000, were up 7 percent over the previous February high set in 1951, and 20 percent ahead of February, 1953. Non-residential awards of \$468,712,000 were down 1 percent from January, but 25 percent above February, 1953; residential awards of \$508,773,000 were up 10 percent over January and 22 percent over February, 1953. And heavy engineering awards of \$243,775,000 were up 13 percent over January and 7 percent over February, 1953.

\*\*\*\*\*

A new non-skid material for getting vehicles off icy surfaces is a gritty, white substance tradenamed "E-Z Out," that is said to be more effective than sand, handier than ashes and safer than salt. The non-skid qualities of the material were discovered more or less by accident. It seems American Buildrok Co. was plagued during icy seasons by disappearance of a few bags from each shipment of certain lightweight plaster aggregates. Company investigators discovered that their delivery men were using the aggregate under the tires to get their trucks off slippery pavement. The substance worked well, the drivers pointed out, because it didn't "scoot" away from the wheels when they spun and, unlike salt, it didn't damage paint or stick to metal. It reportedly "clung to the tires like lint to serge."

\*\*\*\*\*

Deliveries of new domestic freight cars in October set a new high for 1953, according to Missouri Pacific Lines. Deliveries totaled 8727 cars, compared with 5706 in September, and 5437 cars in October of the preceding year. Orders for 1705 freight cars were placed in October. Backlog of cars on order, as of November 1, was 35,171.

## WHAT'S HAPPENING

Canadian construction cost indices, recently compiled by the Dominion Bureau of Statistics, revealed that non-residential building materials prices in 1953 were about twice their prewar level, while residential building materials prices rose three times higher during the same period. The greater use of lumber in home building was explained as one reason for the gap. Since 1949, however, non-residential prices, with percentage increases of about 25 percent being registered for each during the 1949-1953 period. In a breakdown of how the construction dollar is spent for building materials, the following percentages were given for non-residential construction: Aggregates, cement and concrete mix, 11.1 percent; block, brick and building stone, 9.1 percent; tile, 3.8 percent; lath, plaster and insulation, 2.3 percent; roofing materials, 2.9 percent; lumber and lumber products, 10.5 percent; steel and metal work, 20.1 percent; paint and glass, 1.9 percent; electrical equipment and materials, 11.5 percent; plumbing, heating and other equipment, 21.4 percent; hardware, 3.7 percent; and miscellaneous materials, 1.7 percent.

\* \* \* \* \*

A new "soil detergent," which reportedly will increase crop yields by an average of 15 percent (in individual cases, increases ranging all the way to 177 percent) was recently announced by Atlantic Refining Co. The new petrochemical, called PR-51, is a member of the detergent family, similar to chemicals which increase "wetability" of textiles and other substances. Applied to soil surface in amounts ranging from 15 to 50 lb. per acre, PR-51 is dissolved and carried into the soil pores by rain or irrigation water. The scientists emphasized that since the product has no effect on the structure of the soil, it could not be classed as a soil conditioner. Another effect noted by the scientists and still being investigated was the apparent increase in sugar and vitamin content of crops grown in the treated soil. Other advantages claimed with its use included improved soil drainage and faster germination of seeds.

\* \* \* \* \*

Construction costs have remained relatively stable during the past seven months, with the Building Cost Index fluctuating less than one index point from month to month, and the March, 1954, value being only a fraction of a point higher than last August, as reported by Engineering News-Record. The construction Cost Index has fluctuated about the same with the exception of a slight rise in January, 1954. The Construction Cost Index for March was 613.99 (based on 1913=100), which was 0.1 percent below the all-time high of February, and 4.4 percent above March, 1953. The Building Cost Index for March was 437.17 (also a 1913 base), down 0.1 percent from February, and 2.9 percent higher than March, 1953.

\* \* \* \* \*

According to a recent report, two Houston, Texas, plants producing ammonium sulfate, a chemical fertilizer, have been hit by an apparent sales letdown, resulting in the closure of one plant, and curtailing of operations at the other. This, if widespread, would affect demand for agricultural lime and limestone. The sales lag is blamed partly on drought conditions this year in widespread areas of the country and the general slump in farm products prices. Industry sources believe, however, that the sales downturn may be only temporary and predict, over the long run, a continuation of the post-war boom in chemical fertilizers. One industry official reports that although there has been some softening in fertilizer demand during the past few months, recent rains in some farming areas have brought business back to near normal.

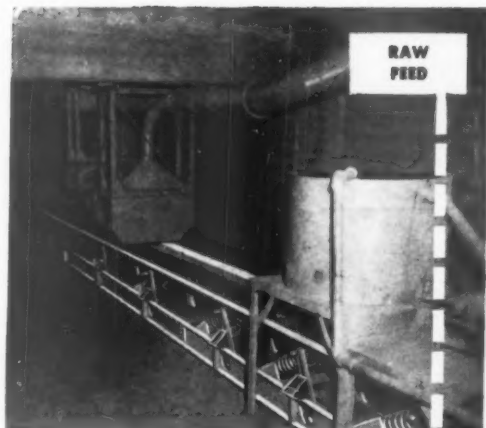
\* \* \* \* \*

Railroads placed 1839 new locomotive units in service during the first ten months of 1953, of which 1822 were diesel-electric; 13, steam; and four, gas turbine-electric. There were 630 new locomotive units on order as of November 1, 1953.

\* \* \* \* \*

The first major use in Wisconsin of cement-stabilized sand for a highway base has been made by the Wisconsin State Highway Commission on a 2 1/4-mi. section of State Highway 54, as recently reported in "Technical Information Digest." A base course of fine sand was laid to a loose depth of 7 1/2 in. and to a width of 22 ft. Cement was spread in two windrows at the rate of 57 lb. per linear ft. A mixer blended the sand and cement on the roadbed and added the proper amount of water. Compacted thickness of the base was 6 in., which was sealed with emulsified asphalt applied at the rate of 0.2 gal. per sq. yd. and blotted with a light layer of sand.

THE EDITORS



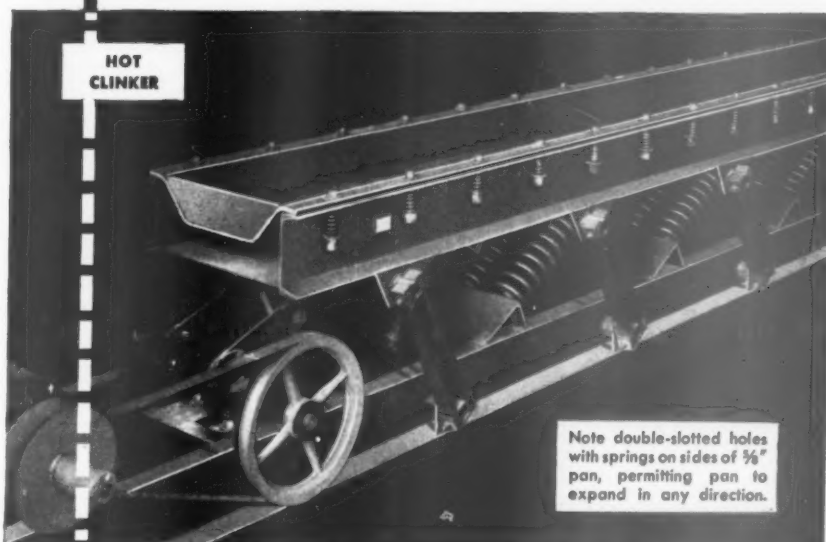
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Up to 30 tons per hour on  
12" models!

**HIGH TEMPERATURE**  
Up to 750° F. on standard  
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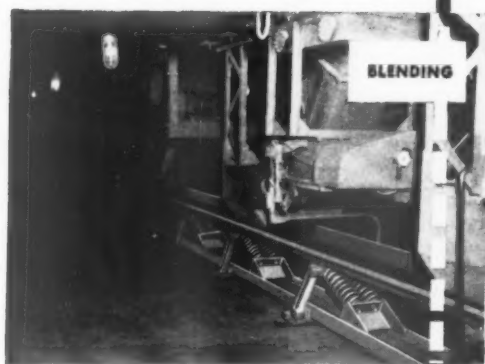
**HEAVY-DUTY SERVICE**  
Pans up to 3/4" plate!

**LOW HORSEPOWER  
ASSURES LOW MAINTENANCE**  
1000 foot-tons per hour  
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The toughest job in a cement plant—conveying and cooling hot clinker—comes naturally to the rugged Carrier Natural-Frequency Conveyor shown above. By comparison, the raw-feed and blending operations are just plain duck soup, but Carrier Conveyors do all three jobs with equal ease and economy.

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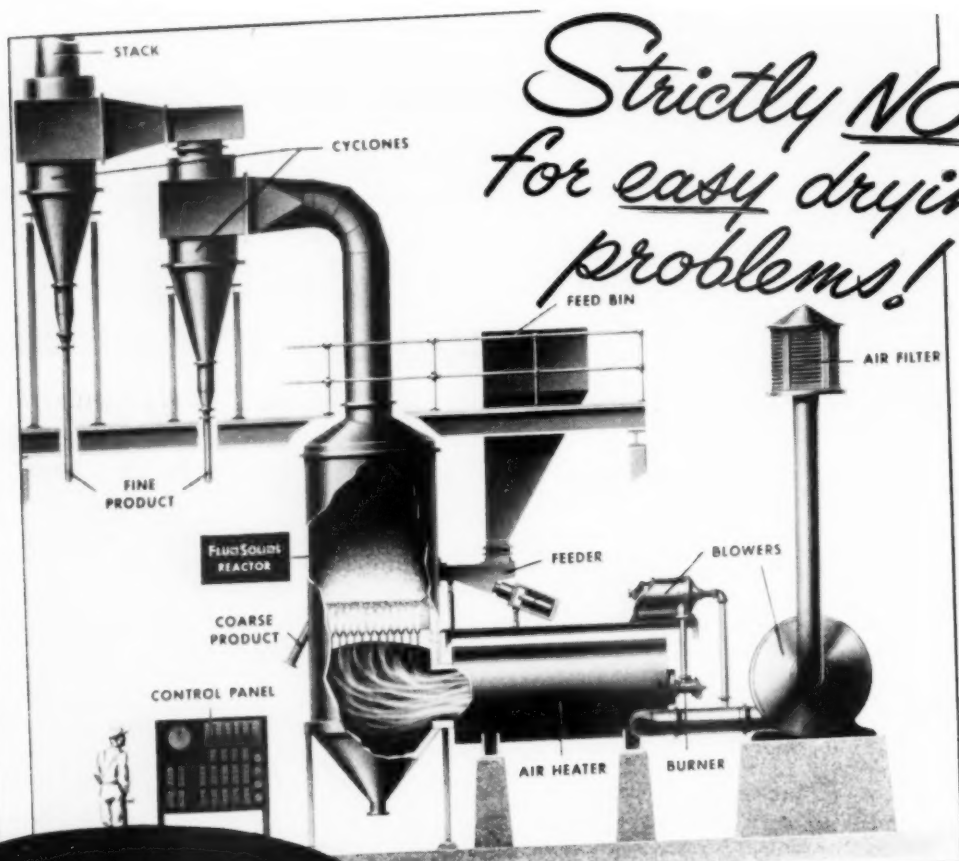
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*Strictly NOT  
for easy drying  
problems!*

## FluoSolids\*

Typical Dorco FluoSolids System utilizing single-compartment Reactor for critical temperature drying.

**designed for the job where exact temperature control is essential to eliminate or induce chemical or physical raw material change.**

If you merely want to remove free moisture and don't need close temperature control — read no further. But if temperature variations in your drying operation are important — if you have to avoid chemical or physical changes in your raw material like poison — or even if you have to induce them — FluoSolids may be your answer.

Why FluoSolids? Well, mostly because it involves techniques that are radically different from conventional drying methods. More specifically,

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Important point is though, FluoSolids is the best answer yet to the critical temperature drying job. And from the capacity standpoint, single units can handle from 10 to 500 tons per day depending upon individual job requirements.

We'd like to send you more detailed information. No obligation of course. The Dorco Co., Stamford, Conn.

\*Reg. U. S. Pat. Off.



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# "We're Bustin' Up Those Big Rocks Now!"

California company reports  
**INTERNATIONAL U-450**  
gasoline engine has power  
to crush bigger rocks than  
ever before possible.

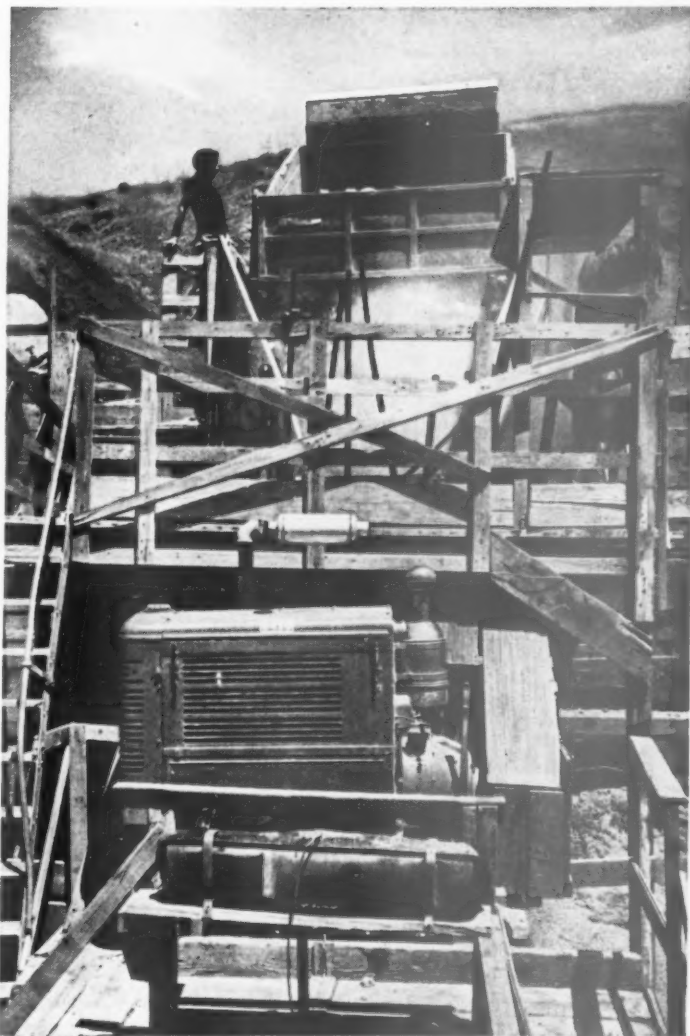
The Goddard brothers of Hayward, California, don't worry about the size of rocks they dump in the hopper of their crushing plant, since they replaced an old engine with a new **INTERNATIONAL U-450** power unit.

Owner John Goddard spells out the transformation this way: *"We're bustin' up those big rocks now. It's all because of our new engine—the **INTERNATIONAL U-450**. She's loaded with power and could easily double our current production of 500 tons daily if we could only get more rock."*

The U-450 is one of the seven new carbureted engines recently added to the **INTERNATIONAL** line which now includes 18 models—diesel, gasoline and gas—ranging from 16.5 to 200 net horsepower.

There's a size for every quarry or pit operation, and you can get expert assistance in cutting your power costs and stabilizing your production by seeing your **INTERNATIONAL** Industrial Distributor or Power Unit Dealer today. He'll give you the low-down on the dividends you can expect from **INTERNATIONAL** "Power that Pays."

**INTERNATIONAL HARVESTER COMPANY, CHICAGO 1**



CRUSHING POWER—102 net horsepower at 1800 rated r.p.m.—is provided by this **INTERNATIONAL U-450** gasoline engine.

For everything in Earthmoving

ON TRACKS ...ON RUBBER

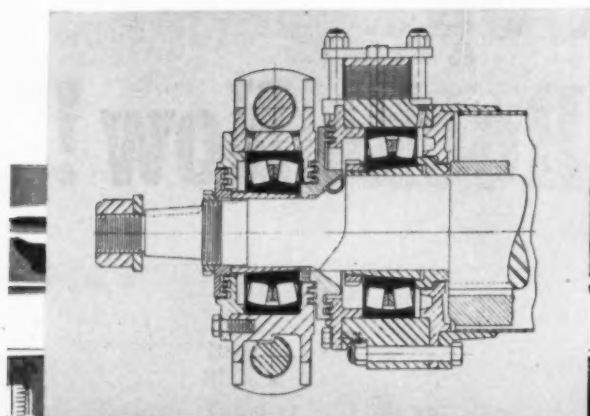
See **INTERNATIONAL'S**  
Complete Earthmoving Line



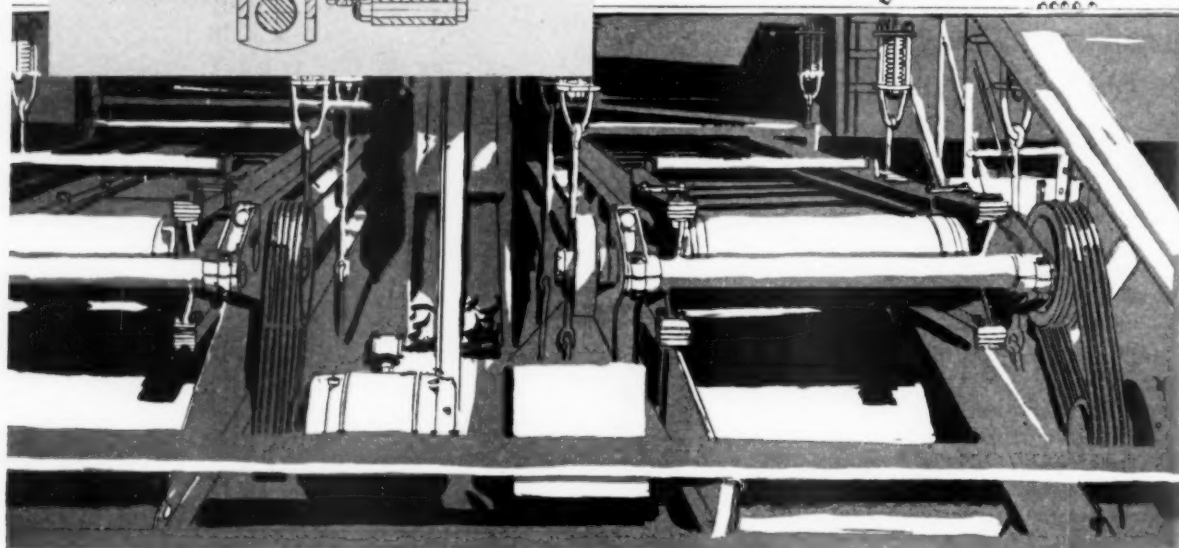
POWER THAT PAYS

**INTERNATIONAL**

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*Drive shaft on Nordberg's positive-action Symons Screen turns smoothly, efficiently under severest conditions on precision-ground TORRINGTON Spherical Roller Bearings.*



## Only the best pass these tests!

Bearing applications in the rock processing industry are about as tough as they come. That's why you find so many screens and crushers, mills and pulverizers equipped with TORRINGTON Spherical Roller Bearings.

TORRINGTON Spherical Roller Bearings have the special features that make the difference: Accurate geometrical conformity between races and rollers—for maximum capacity at all times. Self-alignment—for free-rolling service even under eccentric loading. Contact surfaces precision

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TORRINGTON Spherical Roller Bearings are available from stock with either straight or tapered bore. Try them in your own processing equipment—see for yourself that it pays!

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**MODEL**

**82-A**

**CRAWLER-MOUNTED  
BUCKET LOADER**



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COMPARE  
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your present loading cost . . .

wasted truck time . . . wasted man-hours . . . special operator . . .

the constant 3 cu. yd. per min. loading of the B-G 82-A . . .

the savings in man-hours and money possible on your loading jobs with a B-G 82-A Bucket Loader.

A B-G 82-A Bucket Loader is by all odds the cheapest and fastest method of loading free-flowing materials into trucks. Exhaustive cost analyses made throughout Barber-Greene's over 30 years' experience (during which B-G Loaders handled over a billion yards of material) have consistently proved this.

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Crawler-mounted, the 82-A provides positive traction in all kinds of going—on soft or muddy bases—on spots where pneumatic-tired rigs can't operate.

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CONVEYOR PULLEY**

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**DRUM DESIGN**  
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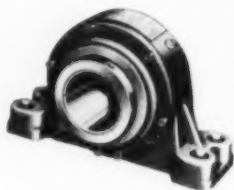
**FULLY ENCLOSED**  
no dust — no dirt — no water

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— full strength in all welds

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**TAPER-LOCK BUSHING**  
— no walking on shaft  
— easy on — easy off!



**DODGE-TIMKEN ALL-STEEL  
PILLOW BLOCK**

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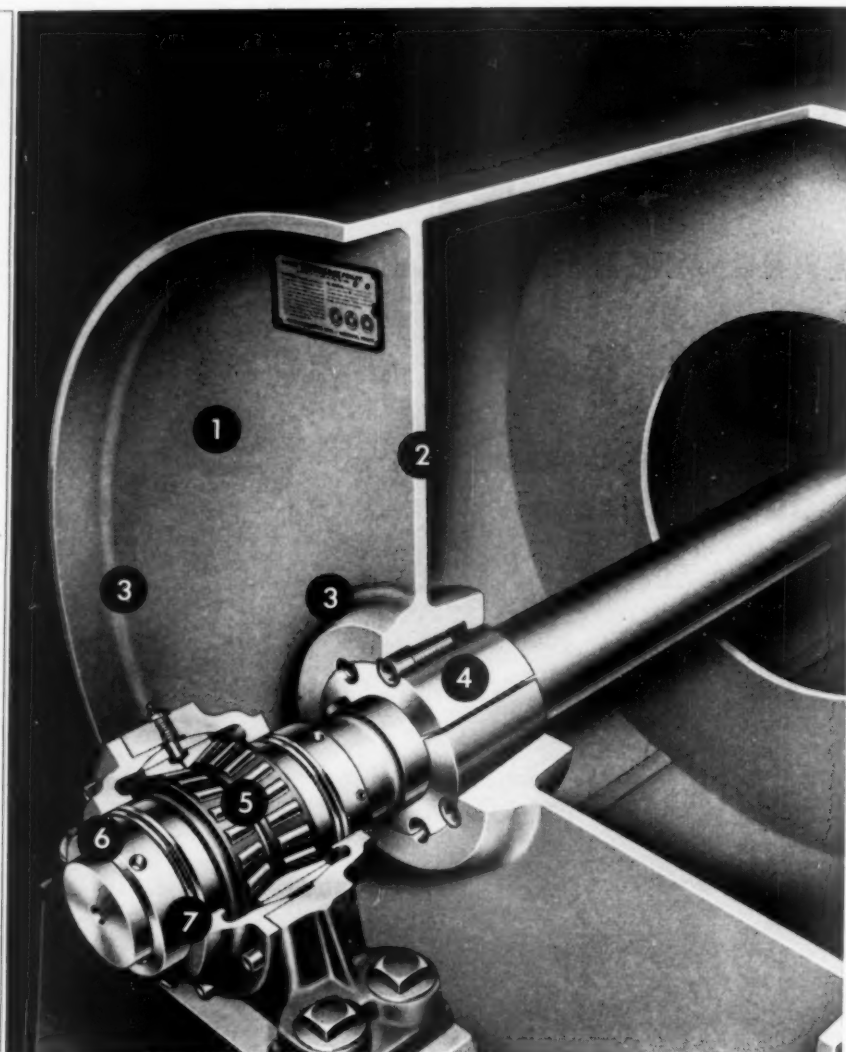
**NEW HEAVY-DUTY  
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— fully self-aligning

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ADAPTER MOUNTING**

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Sealed both on and off  
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**DOUBLE PISTON RINGS**



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Pulleys from 6 in. to 8 ft. in diameter, all face widths.  
Bearings from 2 $\frac{1}{4}$ " to 10" bores. Popular sizes stocked  
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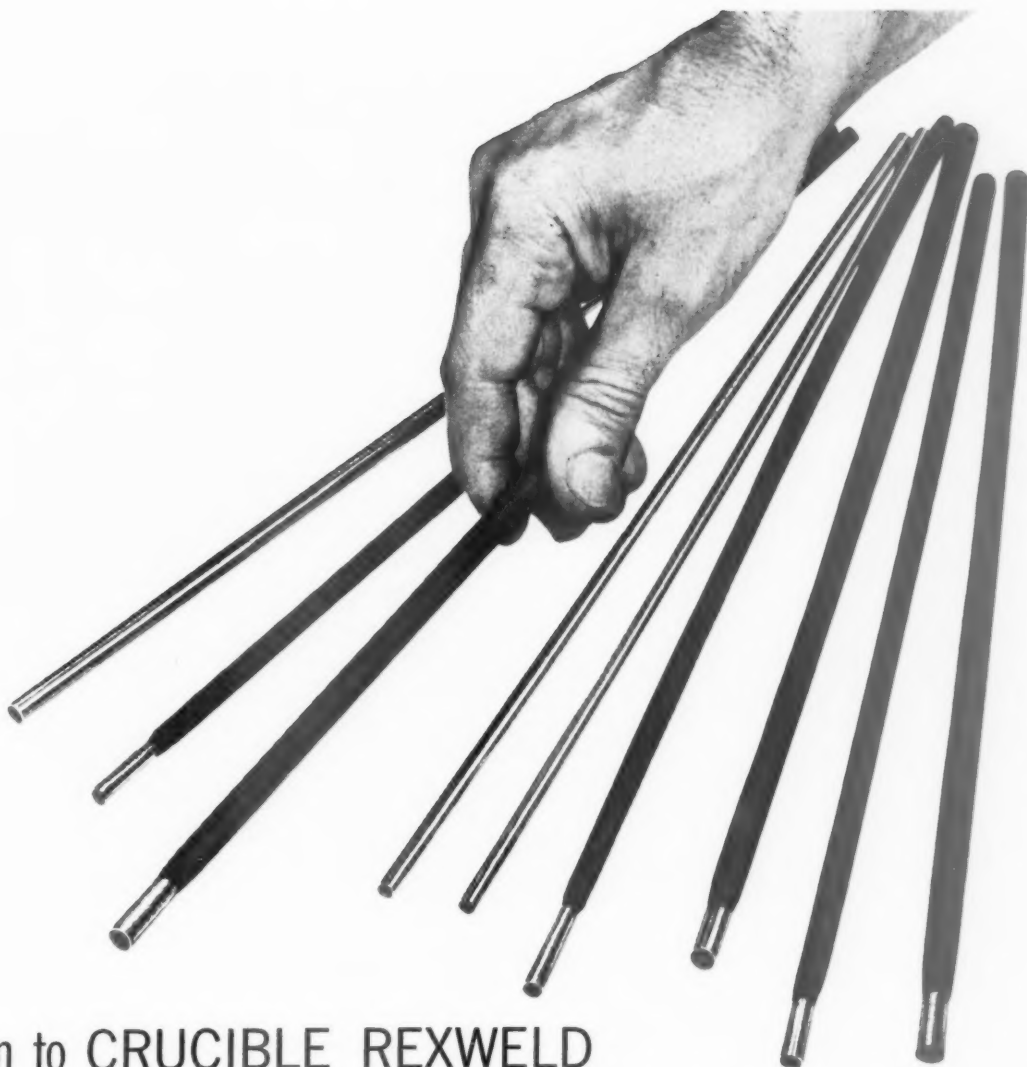
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low hydrogen coated electrodes for superior  
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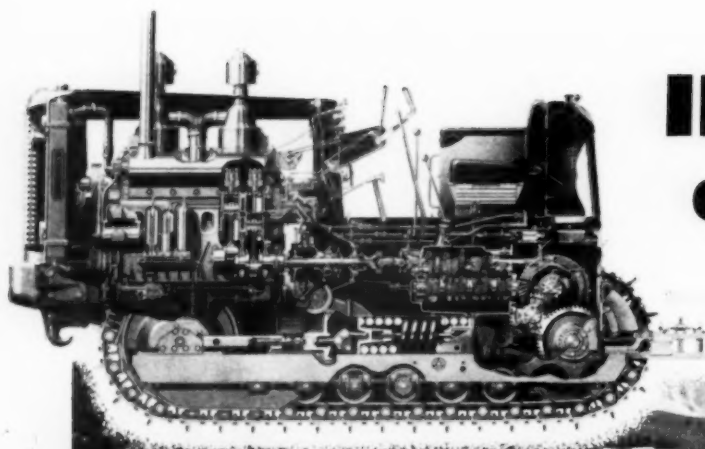
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54 years of *Fine* steelmaking

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Allis-Chalmers tractors are truly modern — new from the ground up, without compromise anywhere in design or material. Built to meet today's demands, users find them more productive, more reliable, easier to operate.

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HD-20	175 net engine*	41,000 lb.
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HD-15	135 net engine*	28,300 lb.
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HD-5	40 drawbar	10,500 lb.

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KENKROME chains are designed to help you fight wear. First, KENKROME is the ideal metal for chains... an already-hard manganese alloy steel that grows even harder when it's subjected to wear and abrasion. Second, many of the chains described in this catalog are of improved design... heavier,

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quarry operation**

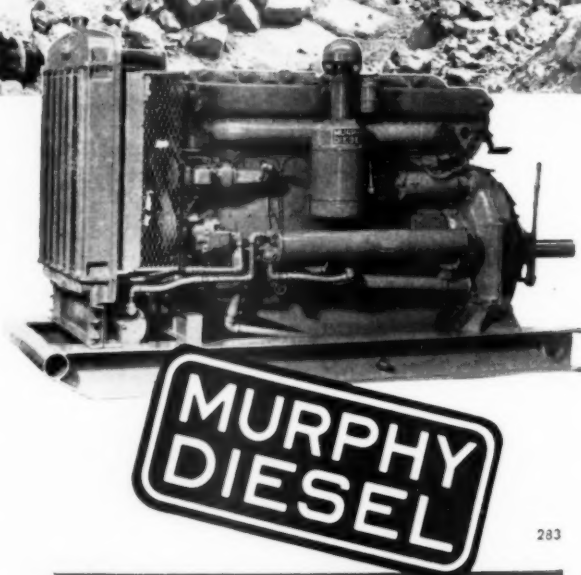


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ANY CRUSHING OPERATION is well-powered when it's Murphy Diesel powered. At the Dillon Stone Co., Columbus Junction, Iowa, a 190 H. P., continuous, Murphy Diesel powers the Cedarapids double impeller impact breaker primary. A 190 H. P., continuous, Murphy Diesel powers the Cedarapids portable hammer-mill secondary crushing and screening unit. A 110 K. W. Murphy Diesel Generator Set (mounted in a truck) supplies electricity for motors on the secondary unit, the portable screening plant and the bins. Here is a crushing operation that takes full advantage of Murphy Diesel's economy of operation, long life and rugged dependability.

You can have these same advantages working for you in your plant whether it's portable or stationary. Just call your Murphy Diesel Dealer. He'll give you full information on how Murphy fits your needs.

**MURPHY DIESEL COMPANY**  
5315 W. Burnham St.  
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Sales, parts, service throughout the nation.



283

### *Heavy duty power* for rock crushing

Murphy Diesel Engines and Power Units are available in sizes from 90 to 240 H.P. Engine speeds are 1200 and 1400 rpm. "Packaged" generating units are available with capacities ranging from 60 to 154 K.W.

**LOWER YOUR COST-PER-TON  
FOR CRUSHED STONE!**



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—IMPACT and DRYER MILLS  
—for fine grinding to 400  
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**AIR SEPARATORS**

—any type; for precision  
control and high production  
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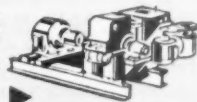


**VIBRATING SCREENS**

—in any size for any job.  
1 to 3 decks, open or en-  
closed.

**HELIX-SEAL  
MILLS**

—for dust-free  
grinding, and for  
wet, sticky, greasy  
materials.



Also: COMPLETE "Packaged" PLANTS  
for crushing, grinding, separating.

**WILLIAMS Heavy Duty  
HAMMER MILLS**

With a Williams, you don't need a primary crusher and another two or more secondary grinders—because a single Williams Hammer Mill does the complete job in one operation!

That means no additional machines are necessary—no extra foundations, housing, conveyors, drives or other equipment—a saving up to 75% on initial investment! And because a Williams does the job faster and better, you can cut your crushing costs up to 50%!

There's a Williams to suit your specific need, no matter what it is! It will pay you to get the facts now!

**TYPICAL WILLIAMS HAMMER MILLS  
AND WHAT THEY CAN DO**

- SUPER-SLUGGER** Crushes power-shovel-loaded stone to  $1\frac{1}{2}$ ",  $\frac{3}{4}$ "—even to 8 mesh—in one operation! Capacities up to 550 tons per hour.
- SLUGGER** Reduces 100-pound stone to  $1\frac{1}{2}$ ",  $\frac{3}{4}$ " or agstone—in one operation! Capacities up to 100 tons per hour.
- NF and GA TYPES** Reduce 4" stone to  $\frac{1}{2}$ ", agstone—or as fine as 20 mesh—in one operation! Capacities up to 200 tons per hour.

**WILLIAMS PATENT CRUSHER AND PULVERIZER CO.**

800 St. Louis Avenue

St. Louis 6, Mo.

**WILLIAMS**

**CRUSHERS**

**GRINDERS**

**SHREDDERS**

**OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD**





## Relief... for a production pain

What's your particular "ache"? Looking for ways to cut costs...improve production...speed plant operations...reduce maintenance costs?

Here's a prescription that can provide an effective solution for you... the specialized service offered by your Chain Belt Field Sales Engineer and the outstanding performance of Chain Belt Equipment:

**for example:** If bucket elevator chain breakage is your "head-ache," Rex® S-858 and S-856 chains will provide relief. These precision-made steel chains will not break...properly applied, they may *wear* out after the longest possible service life. They will outlast...outwear any other chains built for bucket elevator service.

**for example:** If you're having trouble with your chain drives, Rex Chabelco® Steel Chains are your answer. These rugged chains are designed and built for the toughest service, especially where dust, dirt or heat is a problem. They stand up under heaviest loads...transmit more h.p. per dollar.

**for example:** If maintenance is your problem, here's a suggestion. Use Rex Split Hardened Rim Traction Wheels and Sprockets. Just install the body, then each rim segment. Replacement of rim section can be done without removing the chain. Down time can be reduced with these long-wearing traction wheels and sprockets.

Whatever your needs...drive chain, conveyor and elevator chain, complete elevators, belt conveyors, feeders, roller bearings, buckets or sprockets, you'll relieve those production pains by looking to Chain Belt. See your local Field Sales Engineer or write direct to Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee 1, Wis.

# CHAIN BELT COMPANY

District Sales Offices and Distributors in all Principal Cities



One of approximately 1200 on the Minnesota Iron Ranges, this 34-ton "Euc" is loaded by a 5 cu. yd. shovel at a large open pit operation. Rear-Dump models are available with semi-rigid or spring mounted axles, Allison Torqmatic drives and transmissions, or conventional 5 and 10 speed transmissions.

## More Profit with "Eucs" in Mines and Quarries

■ Built for tough off-the-highway service, Rear-Dump and Bottom-Dump "Eucs" and Euclid Scrapers are cutting the cost of moving ore and overburden, sand and gravel, and stone on quarry and mining operations. Big payload capacity, fast travel speed and high job availability add up to more loads per hour and lower cost per ton or yard hauled.

■ Your Euclid Distributor will provide a hauling production and cost estimate for your operation... there's no obligation so get in touch with him soon. Have him show you how Euclid equipment can improve your profit picture.

**EUCLID DIVISION**  
GENERAL MOTORS CORPORATION  
Cleveland 17, Ohio



This Bottom-Dump "Euc" is being loaded with 17 cu. yds. of sand and gravel from an overhead hopper for haul to the washing plant. Owner is Interstate Sand and Gravel of Covington, Ohio.



Ideal Cement Co. of Portland, Colorado uses 22-ton Rear-Dumps with quarry bodies to haul stone from the face to the crusher. Top speed of this Model 36 TD, with full payload, is 32.5 m.p.h. Spring mounted drive axle and Allison Torqmatic drive and transmission are important factors in stepping up production and profits at this quarry operation.



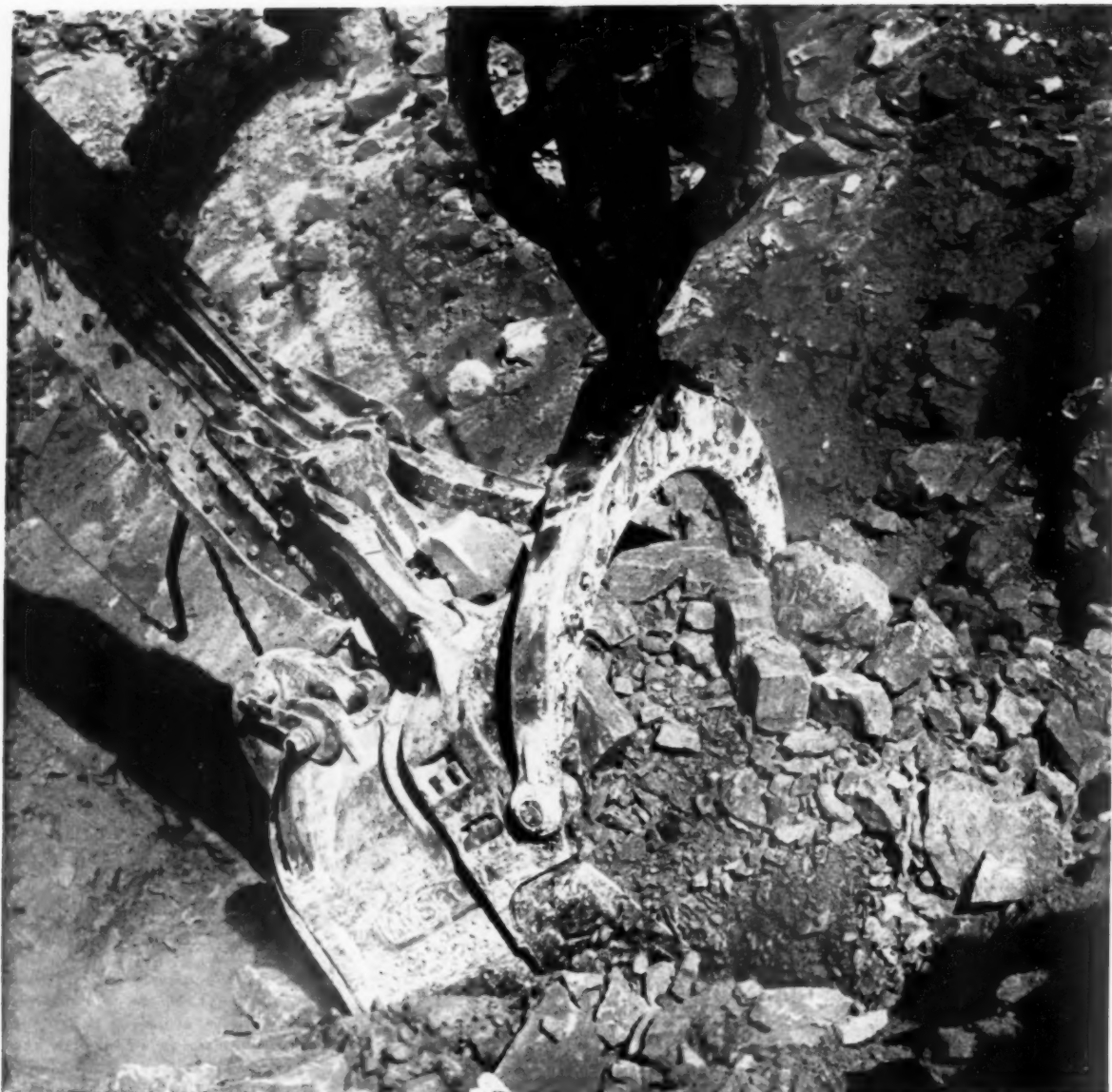
Euclid Twin-Power Scraper stripping overburden at a large gypsum quarry in Iowa. Powered by two 190 or 200 h.p. engines with torque converters and semi-automatic transmissions, this "Euc" self loads, has a struck capacity of 18 cu. yds. and travels up to 30 m.p.h. with full payload.



# Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE





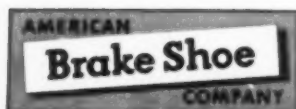
**It costs time and money to be  
ONE DIPPER LATE!**

Amsco manganese steel dippers are regularly ordered for replacement on equipment in the field. Often they go to users who found that ordinary steel dippers simply would not hold up.

It's smart economy to specify tough,

dependable Amsco dippers with original equipment.

Next time you order a power shovel or a replacement dipper, specify long life right on your purchase order . . . specify an Amsco manganese steel dipper.



**AMERICAN MANGANESE STEEL DIVISION**  
Chicago Heights, Ill.

# **GYROSET VIBRATING SCREENS**

## **FOR**

# **SIZING — DEWATERING**



***POSITIVE ECCENTRIC ACTION***  
***POSITIVE STROKE ADJUSTMENT***  
**WITH ONLY 2 BEARINGS**

For scalping and for raw material sizing. A rugged two bearing positive eccentric screen. Adjustable as to stroke from 0 to  $\frac{3}{8}$ " for efficient economical service.

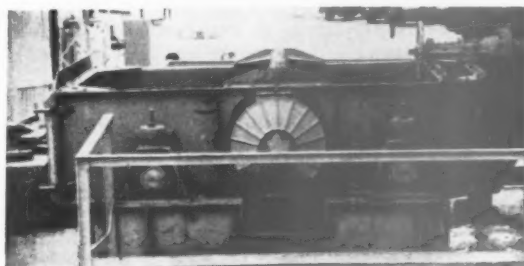
GYROSET Screens have a positive eccentric action giving a full circle throw thruout the length and width of the screen surface. They are two-bearing type providing minimum moving parts to give the required eccentric action.

GYROSET Screens can effectively scalp, size or de-water. Due to the adjustable action, the ability to operate at high speeds, and at any degree of pitch (or slope), GYROSET Screens can be readily adjusted as to action to give maximum volume for rough scalping—or can be adjusted to give the highest possible degree of efficiency in grading or in de-watering—at higher capacity than any other screening unit.

Electrically heated cloth can be supplied for damp operations.

Our "L & L" Cleaner will handle near-size blinding difficulties.

For slurry scalping, or any type washing or de-watering operations. Simple construction yet flexible in action. Size ranges from 18" to 72" in width and 4' to 16' in length—in one to three decks.



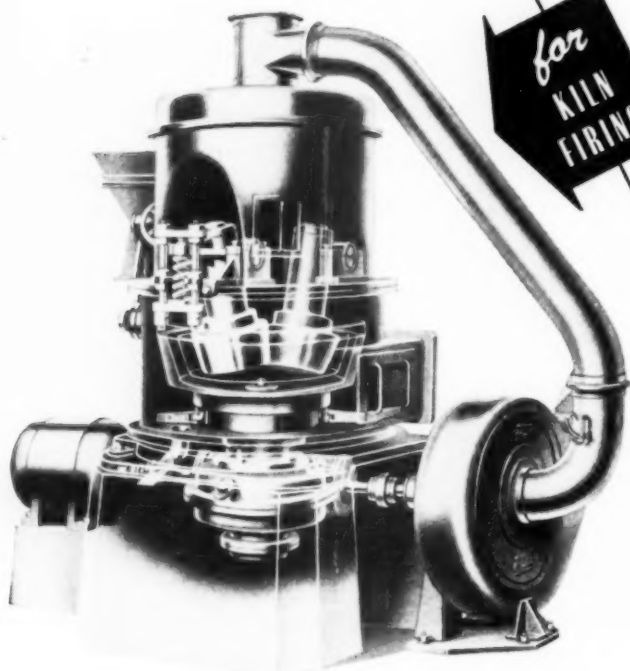
## **PRODUCTIVE EQUIPMENT CORP.**

2926-28 W. LAKE ST.

CHICAGO 12, ILL.

*For  
Lower Costs  
Specify*

# RAYMOND EQUIPMENT *for*



*for  
KILN  
FIRING*

## BOWL MILL

THE Raymond Bowl Mill provides a complete and fully coordinated system of coal grinding and direct firing for rotary kilns. It helps to maintain maximum kiln efficiency by providing flexible firing control and instant response to meet changing load conditions.

This modern direct firing unit readily handles coal of any grade or moisture content. It is easily adjusted or lubricated while running and is sturdily built for continuous 24-hour operation. All controls are centralized on a panel board which simplifies the supervision of one or several mills.

Well over two thousand installations have proved the superiority of the Bowl Mill in dependability and economy of operation and maintenance.

*Write for Bowl Mill Catalog #62*

## MECHANICAL AIR SEPARATOR

WITH DOUBLE WHIZZER

This modern centrifugal separator is well adapted to classifying hydrated lime and limestone.

The Whizzer feature and fineness control provide significant advantages whether the job requires separation to produce a high fineness material, or in the case of a dedusting operation to remove objectional fines, as required for bituminous concrete.

It is also highly efficient in closed circuit grinding operations in combination with a pulverizing unit.

*Write for Separator Catalog #71*



*for  
CLASSIFYING  
LIME PRODUCTS*



# COMBUSTION

RAYMOND DIVISION

# LIMESTONE AND LIME PRODUCTS

To modernize is to economize . . . and this holds good in the lime industry where you can effect definite savings over your former methods by equipping your plant with the latest type of Raymond pulverizing, air separating and flash drying units.

The Raymond line includes specialized units for direct-firing pulverized coal to rotary kilns, drying and grinding limestone, disintegrating and classifying hydrated lime, pulverizing and separating agricultural limestone . . . all with automatic, dustless operation.

## SUPER ROLLER MILL

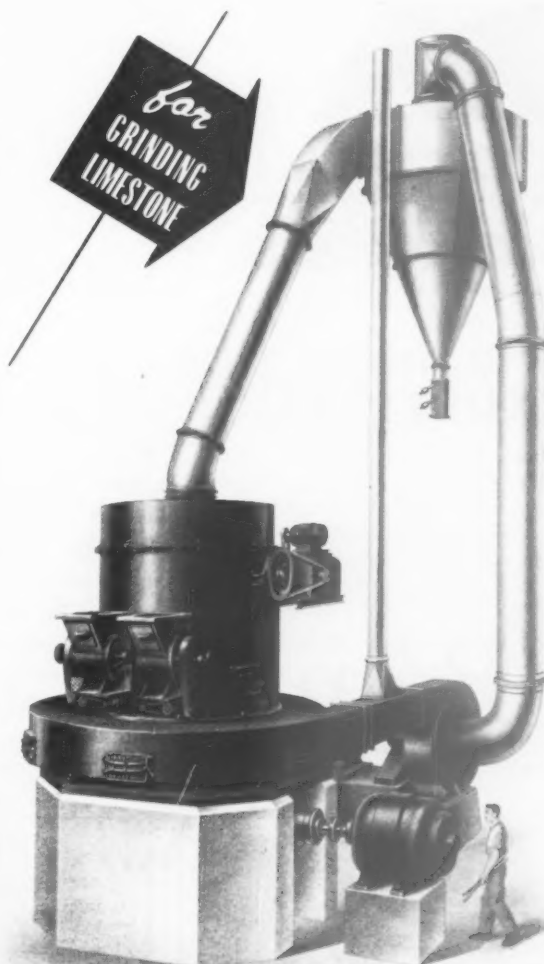
Raymond Roller Mills have long been standard equipment in the limestone grinding field . . . and today with the trend toward huge production plants, there is demand for Super Roller Mills which provide capacities of 15, 20 and 30 tons or more per hour of finished material.

These big machines offer economical advantages in conserving space, centralizing operations, simplifying material handling, also savings in installation, maintenance and supervision costs compared to a multiple mill installation of equivalent output.

In a recent application, a Raymond Super Roller Mill has been installed, as part of a new plant expansion program to supplement the present smaller units, thus greatly increasing daily production. This giant mill is equipped with Flash Drying accessories for handling Virginia limestone containing several per cent initial moisture. As it dries and grinds in one simultaneous process, the Super Roller Mill shows an outstanding record of low cost production of quality grades of limestone.

For handling hydrated lime, the well-known Raymond Automatic Pulverizer with Whizzer Separation is widely used as the standard machine in the industry. It disintegrates and classifies the lime, and automatically rejects impurities, delivering a uniformly fine, high purity finished material.

*Write for further detailed information.*



# ENGINEERING, Inc.

1307 NORTH BRANCH STREET • CHICAGO 22, ILLINOIS

*Sales Offices in Principal Cities*

How Bemis makes  
GOOD multiwall bags  
for you

## Experienced Hands Run Our Tubers!

Tubers—the big machines that fold and paste the multiple kraft plies—are the heart of multiwall bag making. Running, they look pretty automatic. But you don't learn to run a tuber by reading an instruction manual. It takes long experience, knowing eyes, deft hands, to keep the plies properly nested and paste properly applied . . . and to control the many other factors that affect the performance of the finished bag. We've been making multiwalls for twenty-seven years . . . so there's plenty of bag-making experience in our twelve multiwall plants strategically located coast to coast.



# Bemis

**General Offices — St. Louis 2, Mo.**  
**Sales Offices in Principal Cities**

[illegible][illegible]

No 2 of a crew.

With a Bennis in Motion  
500-2200 (most used) Range  
1000 Miles

1. 1980 Bennis 500-2200 (most used) Range  
2. 1980 Bennis 500-2200 (most used) Range  
3. 1980 Bennis 500-2200 (most used) Range  
4. 1980 Bennis 500-2200 (most used) Range  
5. 1980 Bennis 500-2200 (most used) Range  
6. 1980 Bennis 500-2200 (most used) Range  
7. 1980 Bennis 500-2200 (most used) Range  
8. 1980 Bennis 500-2200 (most used) Range  
9. 1980 Bennis 500-2200 (most used) Range  
10. 1980 Bennis 500-2200 (most used) Range

Go of big printing requires three things... and Bennis has all!

1. High speed. The Bennis 500-2200 (most used) Range...  
2. High speed. The Bennis 500-2200 (most used) Range...  
3. High speed. The Bennis 500-2200 (most used) Range...  
4. High speed. The Bennis 500-2200 (most used) Range...  
5. High speed. The Bennis 500-2200 (most used) Range...  
6. High speed. The Bennis 500-2200 (most used) Range...  
7. High speed. The Bennis 500-2200 (most used) Range...  
8. High speed. The Bennis 500-2200 (most used) Range...  
9. High speed. The Bennis 500-2200 (most used) Range...  
10. High speed. The Bennis 500-2200 (most used) Range...

**Bennis**  
Bennis Printing Co. Inc.  
1000 Miles

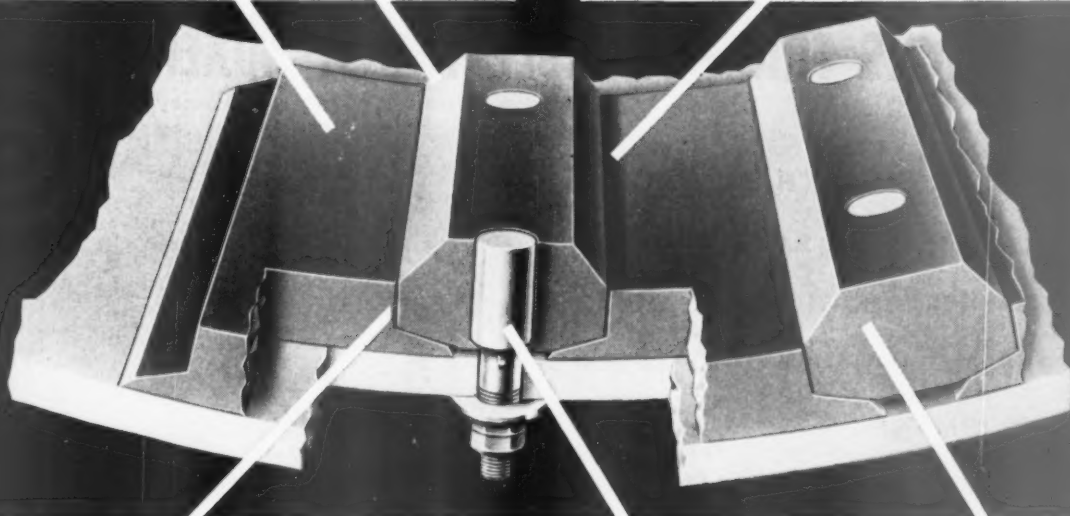
 

1000 Miles 1000 Miles

1000 Miles 1000 Miles

Plates are interchangeable. Localized wear may be compensated for by heat treating.

Plates made to accurate size, in easy-to-handle sections . . . go in faster.



Accurate fit of lift bars and tight joints eliminates shell wash and allied troubles.

Support for bolt head located near bottom of bar . . . bolts effective for life of lining.

Lift bars designed for correct cascade action. Height of lift varied to suit conditions.

## A money-saver in any type mill . . .

# USS LORAIN ROLLED PLATE LININGS

● No matter what type of grinding mill you operate, it will pay you to take a look at these cost-cutting advantages of USS Lorain Rolled Plate Linings:

**You save on installation time and labor.** Lorain Liner Plates can be installed quickly, easily . . . they are made to accurate size and in easily-handled sections.

**You save valuable grinding space.** The great strength and abrasion-resisting qualities of the rolled steel from which Lorain Plate Linings are made, safely permit the use of reduced thickness. This means an increased usable diameter, increased output for your mill.

**You save "down-time" for repairs.** Costly mill repairs are reduced with Lorain Plate Linings because the tight fit between ends of plates and between plates and lift bars eliminates shell wash and associated troubles.

**You save on replacement materials.** USS Lorain Rolled Plate Linings last longer. And severe localized wear at feed or discharge ends can be compensated for simply by reversing the worn plates at opposite ends. You get full-life use from your

Lorain Plate Linings.

There are USS Lorain Rolled Plate Linings to fit any type of mill—for wet or dry grinding. They are available through leading mill manufacturers whose names will be furnished upon request.

## USS Grinding Balls offer dependable, economical grinding action



Production of USS Grinding Balls is carefully controlled to assure uniformity, surface hardness and maximum hardness penetration. They are available in diameters from  $\frac{3}{4}$ " to 5". Mail the coupon below for our free booklet on USS Grinding Balls.

United States Steel Corporation  
Room 4313, 525 William Penn Place  
Pittsburgh 30, Pa.

Without obligation on my part, please send me your FREE booklet on USS Grinding Balls.

Name   
Company   
Address   
City  State

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

## USS LORAIN ROLLED PLATE LININGS AND USS GRINDING BALLS



4-814

UNITED STATES STEEL

# VETERAN COOK BLOCK CO. GETS INTO READY-MIX FIELD; PICKS ERIE PORTABLE TRUCK MIXER PLANT

CROSWELL, MICH., BUILDING SUPPLY FIRM SAYS: "ANY FURTHER ADDITIONS TO OUR PRESENT SET-UP WILL BE ERIE EQUIPMENT."

RALPH W. COOK, MANAGER

Recently the Cook Block Co., in the building supplies business for more than 40 years, wanted to expand their activities. The growing demand for concrete suggested that a ready-mix plant would make a worthwhile addition to their existing facilities.

When deciding on batching equipment, they chose Erie because they considered it properly engineered and well designed to do their specific job. Performance of this plant has proven their judgment right.

If you are contemplating entering the ready-mix concrete field or are considering replacing your present plant, learn the facts about Erie before you make any decision.



*One man is all that's needed to run this plant for Cook Block Co. Equipment includes: Erie Portable Combination Bin model GTES-79 cu. yds. with EWEH 3-cu. yd. combination AggreMeter; 75 TPH aggregate elevator and 50 TPH cement elevator. Sold by Contractors Machinery Co., Detroit, Mich.*

For further information, write Dept. P44

Cable Address: EXIMPORT

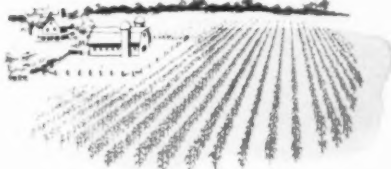
FORMERLY ERIE STEEL CONSTRUCTION COMPANY

## ERIE STRAYER Co.

SAME PEOPLE • SAME PRODUCTS • JUST A NEW NAME

444 GEIST ROAD • ERIE, PENNSYLVANIA

*From the agricultural areas of the nation...*



*to the sidewalks of every village, town and city...*



# LIMESTONE

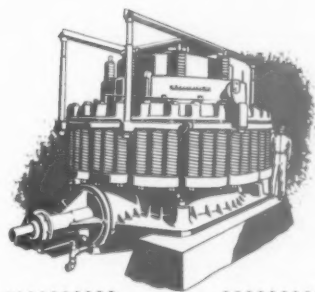
has paced the progress of AMERICA



In the great agricultural lands of America, limestone has long been recognized as an invaluable aid to raising better crops... as well as an important mineral supplement in poultry and animal feeding. In the building of the modern cities of today, limestone has paced America's progress by making possible better roads and streets, building stone, cement, steel for building and transportation, glass... and hundreds of other materials and products that are woven into the pattern of modern civilization.

With man's continual expansion of the number of uses of limestone, and ever-increasing refinements in specifications, the problem of rapidly furnishing properly sized stone to meet today's requirements has become more difficult. Symons® Cone Crushers have become the answer to scores of these problems, and as a result, hundreds of Symons Cone Crushers... in both Standard and Short Head types... have been installed by most of the leading producers of crushed limestone throughout the world.

Thus, in limestone operations... as in all of the great ore and industrial mineral operations the world over... SYMONS Cone Crushers are relied upon to efficiently produce great quantities of finely crushed product at low cost.



.....  
 • SYMONS Cone Crushers...the machines that revolutionized crushing practice... are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.  
 ..... C353

**NORDBERG MFG. CO., Milwaukee, Wisconsin**

SYMONS... A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD



## NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON • TORONTO  
MEXICO, D.F. • LONDON • PARIS • JOHANNESBURG





SYMONS  
GYRATORY  
CRUSHERS



GRINDING  
MILLS



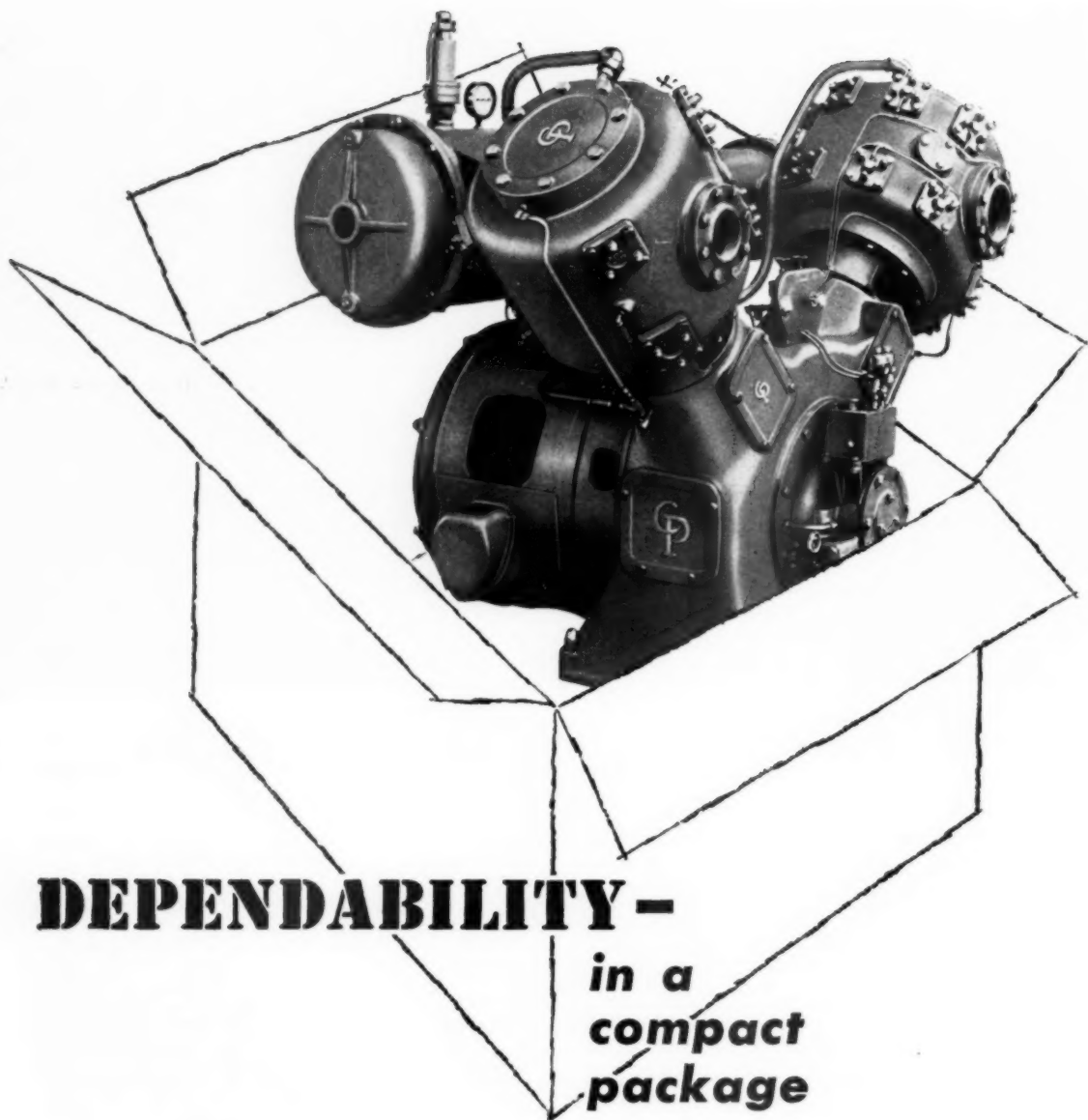
SYMONS "V"  
SCREENS



SYMONS  
VIBRATING BAR  
GRIZZLIES  
and SCREENS



DIESEL ENGINES



## **DEPENDABILITY —** **in a** **compact** **package**

With floor space at a premium, CP's space-saving Type Y Compressor is the answer! Shipped as a package ready for easy installation on a simple, inexpensive foundation, the dependable Type Y is designed for continuous operation and long life with high efficiency. Location of air inlet and discharge openings on cylinders permits the simplest and most compact piping arrangement. The "Y" arrangement also provides maximum accessibility to cylinders and to the easy-to-clean, easy-to-maintain shell-and-tube intercooler.

The Type Y has roller main bearings, precision connecting rod bearings, and multi-step capacity regulation. Available from 75 to 250 hp; 410 to 1663 c.f.m. capacity, and in single or multi-stage designs for a wide range of pressures. *Chicago Pneumatic Tool Co., 8 East 44th St., N. Y. 17, N. Y.*



# **Chicago Pneumatic**

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

# THE ONLY MODERN FRONT END ... ON QUARRY SHOVELS



110-B, 4½ cu. yd.

150-B, 6 cu. yd.

190-B, 8 cu. yd.

Convertible  
Shovels —  
Draglines

**T**HE new Bucyrus-Erie Ward Leonard electric shovels bring to quarry loading the first important departure from the old-fashioned shovel front end. This advanced design — with two-section boom, inside tubular handle, and quiet positive rope crowd — increases speed and payload. It reduces upper boom weight, puts extra strength in the lower section where maximum strength is needed. It cuts out old-style handle racking and crowd pinions, takes the deadweight of crowd machinery off the boom. And, most important to *you*, it gives you all these field-proven performance advantages:

- **Lighter Weight, Greater Strength** — Two-section boom, with light upper section . . . lower section strut-connected to the A-frame.
- **No Handle Twist** — Inside tubular dipper handle is free to rotate in rubber-cushioned saddle block.
- **No Handle Binding in Saddle Block** — Rope crowd is quiet, positive, eliminates handle racking and crowd pinions.
- **No Dipper Wobble** — Twin dual hoist ropes put hoist power where needed for steady travel of dipper through bank.
- **No Sway Braces** — Widespread boom feet eliminate accessory boom braces or cables.
- **Low Swing Loads** — Advanced front end design, with crowd machinery on deck, cuts dead load on swing, steps up swing speed.
- **High Pay Loads** — Single tubular handle — with improved dipper back connections, dipper trip on saddle block, no dipper bail — reduces dead load on hoist, leaves more power for digging.

31153C

There's much more to the story, too. Deck machinery, electrical equipment, and mounting all match the front end in advanced engineering and outstanding performance advantages. The full story will convince you that yard for yard, dollar for dollar, pound for pound, these are the finest rock excavators ever built.

*Write for Complete Information Today!*

**BUCYRUS  
ERIE**

**BUCYRUS-ERIE COMPANY**

SOUTH MILWAUKEE, WISCONSIN



# QUARRY OWNER HITS 1,273 TONS DAILY OUTPUT WITH HIGH-SPEED <sup>SCHIELD</sup> *Bantam*® METHOD

W. B. Mount, Maymead Lime Co., Shouns, Tenn., AVERAGED 127 CU. YDS. HOURLY in one 9 hour day . . . AVERAGED 1,273.04 TONS daily in a 9-day operation, loading out stockpiled crusher run stone! According to Mount, this remarkable production record was achieved the FIRST time they had enough trucks to keep up with the BANTAM! Here is the daily record:

1st Day	— 1146.27 Tons
2nd "	— 1142.00 "
3rd "	— 1186.11 "
4th "	— 1234.00 "
5th "	— 1392.00 "
6th "	— 1467.00 "
7th "	— 1436.00 "
8th "	— 1346.00 "
9th "	— 1108.00 "

TOTAL 11,457.38!

## OWNER PLEASED WITH PERFORMANCE

"Needless to say," commented owner Mount, "we are very much pleased with this piece of equipment in handling our agricultural lime and construction stones!"

You, too, can realize tremendous production boosts and savings in equipment and manpower costs with the low cost BANTAM method! BANTAMS cost you less to buy . . . less to own and operate, and get the tough jobs done faster!

NOW is the time to see a BANTAM in action ON YOUR JOB! A free demonstration can easily be arranged WITHOUT OBLIGATION! See for yourself how the BANTAM feeds crushers and ready-mix batching plants . . . how the BANTAM Truck-Crane with its big 12,000 lb. lifts can replace your older gin-pole methods for faster handling of cut stone . . . how the BANTAM keeps up with a constant stream of trucks in your pit!



**BANTAM'S NEW CRAWLER . . .** with low ground bearing pressure, brings added efficiency to the sand and gravel pit. Full Circle swing makes it easy to load out of tight spots or to trucks on either side of rig! Independent, 2-speed travel makes easy work of side-bank digging . . . Automatic dipper trip (optional) cuts time between bites to a minimum!



## YOU CAN'T AFFORD NOT TO OWN A BANTAM

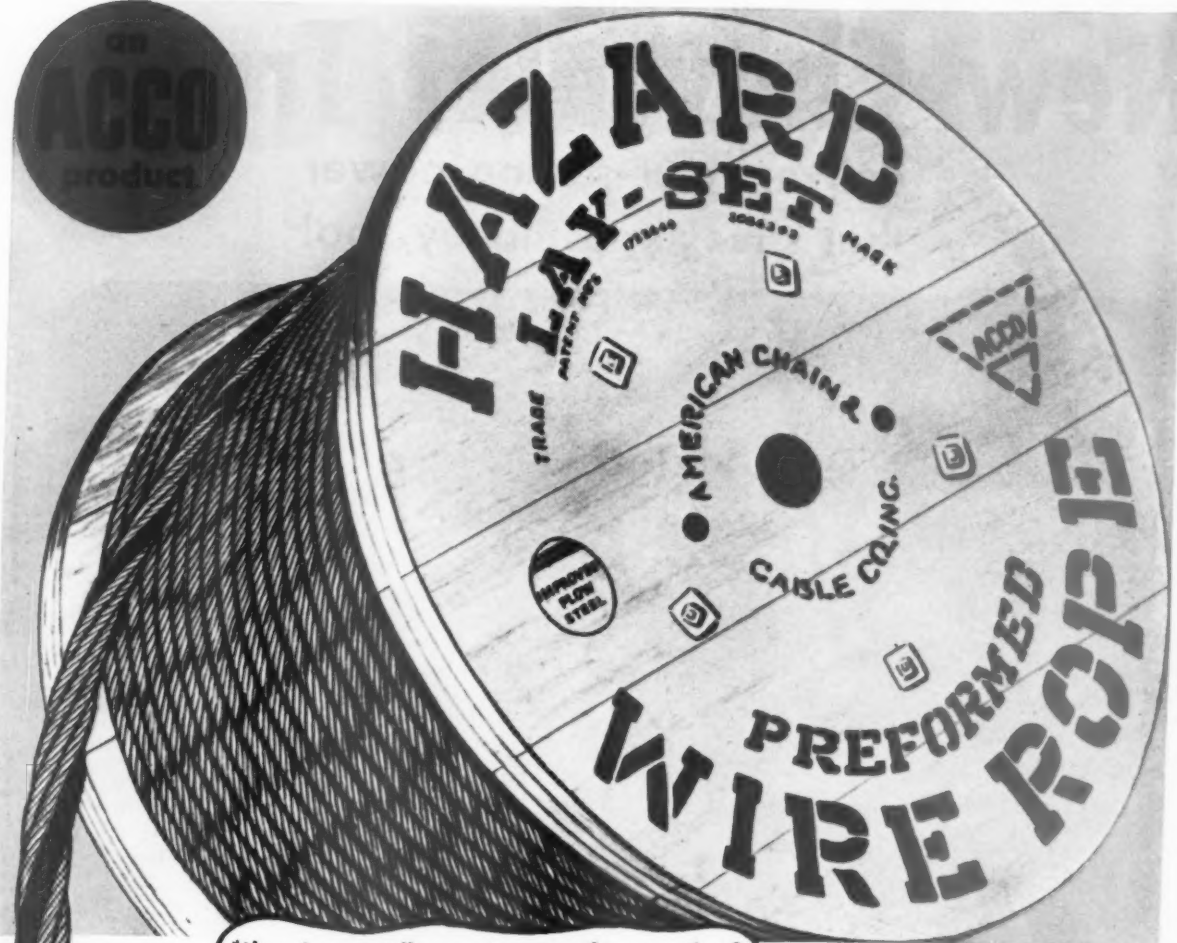
It makes good dollar sense! Low initial cost . . . low operating cost . . . low upkeep and repair . . . that's the economy of owning a BANTAM! All this PLUS high production and many time and labor saving features normally found only on larger, more expensive rigs, adds up to profitable operation in any man's language. There's a BANTAM mounting, too, that will fit your needs EXACTLY! BANTAMS mount on Crawlers . . . Crane Carriers . . . Remanufactured trucks or on your own truck! See for yourself! Ask for a free demonstration on your job . . . ask for free literature on the BANTAM Shovel-Crane Line . . . DO IT TODAY!

SB - TMSH - 1



<sup>SCHIELD</sup> *Bantam*  
COMPANY • 216 PARK ST., WAVERLY, IOWA, U.S.A.

WORLD'S LARGEST PRODUCERS OF TRUCK-CRANES AND EXCAVATORS



"How do you tell one wire rope from another?  
They all look the same to me."

"It's not easy, but during the 15 years I've been  
using wire rope I've learned this: Pick a good brand  
and stick to it. We decided on HAZARD Lay-Set Preformed  
which has a green strand for quick identification.

HAZARD makes a complete line and their  
recommendation book tells us the constructions  
that will give us the best service.

"HAZARD has good distributors wherever we  
operate and we can pick up what we need in a hurry."

**Get** a free copy of No. 129-B HAZARD  
"Wire Rope Recommendations for General Contractors."  
See your nearby HAZARD distributor  
or write our Wilkes-Barre, Pa., office today.

**ACCO**



**Hazard Wire Rope Division  
AMERICAN CHAIN & CABLE**

Wilkes-Barre, Pa., Chicago, Denver, Houston,  
Los Angeles, New York, Odessa, Tex., Philadelphia,  
Pittsburgh, San Francisco, Bridgeport, Conn.

# New Chevrolet Trucks

deliver hour-saving power  
that saves you money, too!



New Chevrolet trucks bring you great new engine power in every model—from light-duty pickups to heavy-duty tractors. And this new power means important savings of both time and money on the job!

## YOU SAVE TIME WITH GREATER SAFETY

That's because new Chevrolet trucks permit you to maintain faster schedules *without* driving at higher maximum road speeds. Thanks to greatly increased acceleration and hill-climbing ability, you can save time where it counts. Instead of trying to make up for lost time, you actually cut down the time lost at traffic lights and on steep grades.

## YOU SAVE PLENTY ON OPERATING COSTS

New Chevrolet trucks bring you high-compression power that saves you money every mile. All three great

engines—the "Thriftmaster 235," the "Loadmaster 235" and the "Jobmaster 261"\* deliver greater horsepower *plus* increased operating economy. In addition, the mighty "Jobmaster 261" engine reduces the need for operating in low gears on heavy-duty jobs. As a result, you shift gears less . . . save more on gas.

Now's a good time to see your Chevrolet dealer about a time-saving, money-saving truck. . . Chevrolet Division of General Motors, Detroit 2, Michigan.



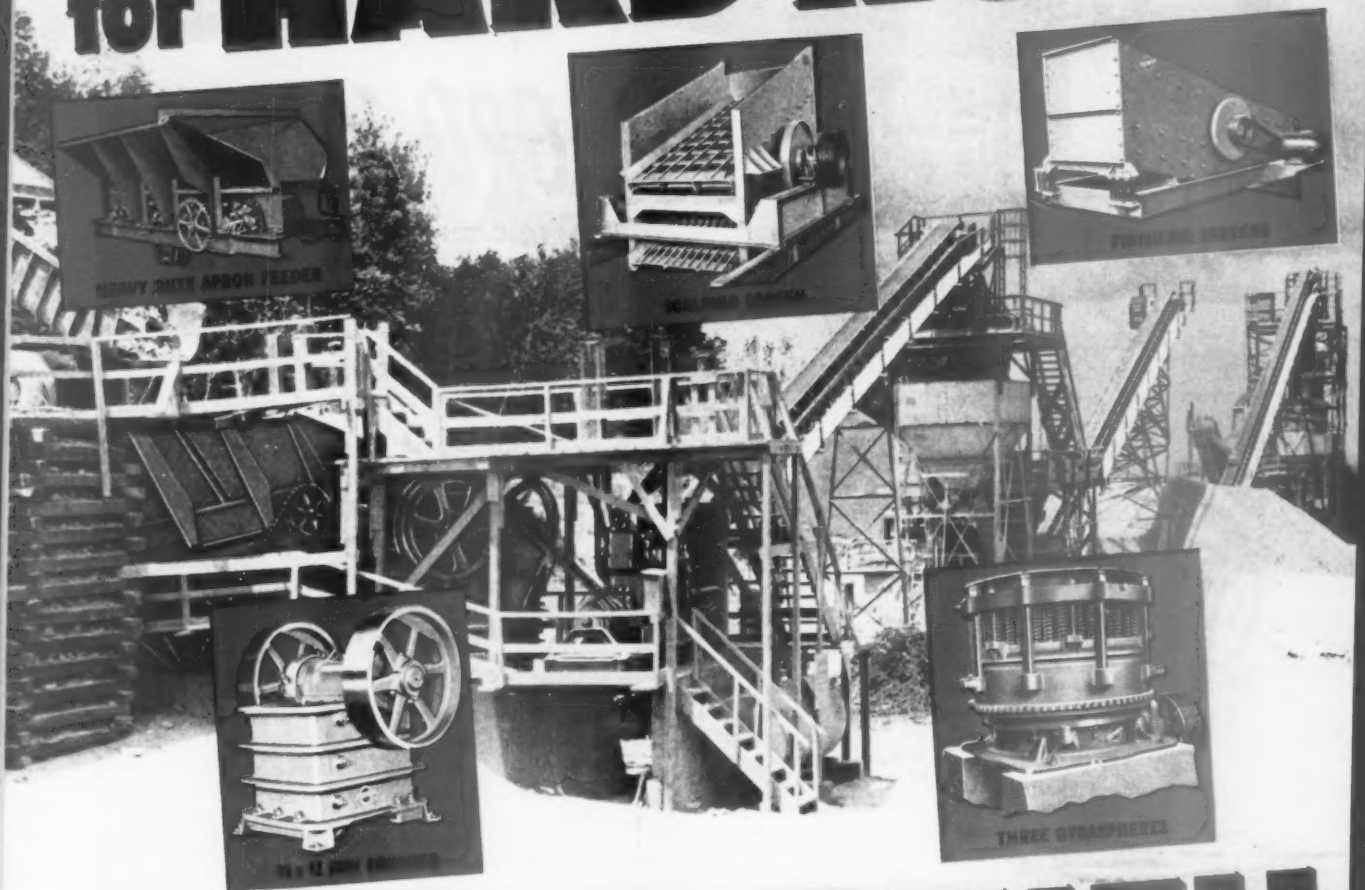
**MOST TRUSTWORTHY TRUCKS  
ON ANY JOB!**

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Q-27

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# DEMPSTER DIGGSTER GRD-101

✓ **NEEDS NO WHEEL TRACTION**

Loading of the bucket is accomplished by the exclusive Hydraulic Crowd and Hoist power of the Dempster-Diggster.

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This is important because the Dempster-Diggster has the digging height capacity to handle jobs oftentimes expected only of power shovels. The dumping height is 9'6" and the digging height is approximately 15 feet. This enables the Dempster-Diggster to work with high dump equipment.

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✓ **MINIMUM TURNING RADIUS**

The outside turning radius of the Dempster-Diggster is only 18'3".

✓ **ELECTRIC BUCKET TRIP**

You get a machine with an automatic electric bucket trip for dumping drop bottom digging bucket . . . giving you instant dumping and instant closing of bucket.

✓ **TRUCK-SPEED MOBILITY**

Dempster-Diggster moves from job to job without the use of hauling equipment or can be towed behind a dump truck with the use of a tow bar.

✓ **HYDRAULICALLY STEERED**

Your Dempster-Diggster has positive hydraulic steering booster which is operated by separate, individually driven pumps. Your operator stays fresh, will not tire with this finger-tip steering.

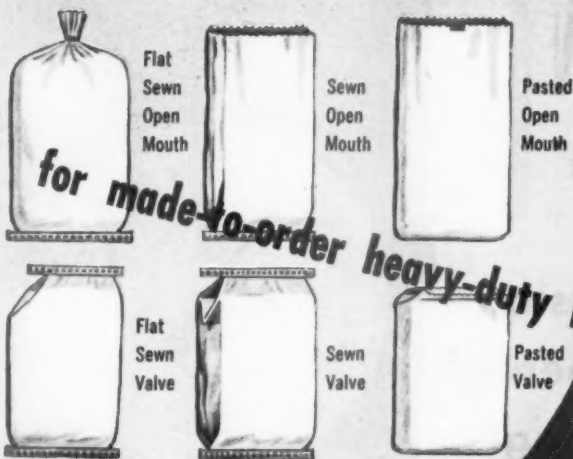
Here's a shovel that won't skim the bank or bottom—but gets a full bucket with every stroke. Here's a shovel that gives you the extra speed on the job and to and from jobs that means extra profits to you! Pound for pound, dollar for dollar, the Dempster-Diggster will out-dig and out-load any other available competing machine in tough going! Let us prove that statement! Write for complete information, including Folder No. 3116.

You get a truck payload with a Dempster-Diggster. Note truck is loaded to maximum heaped capacity, yet Dempster-Diggster has ample clearance.



Photo above shows bucket against front of frame in the position which enables Dempster-Diggster to dig 15 inches below grade.

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Dependable as a Service  
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since the L.C. Sleeve.

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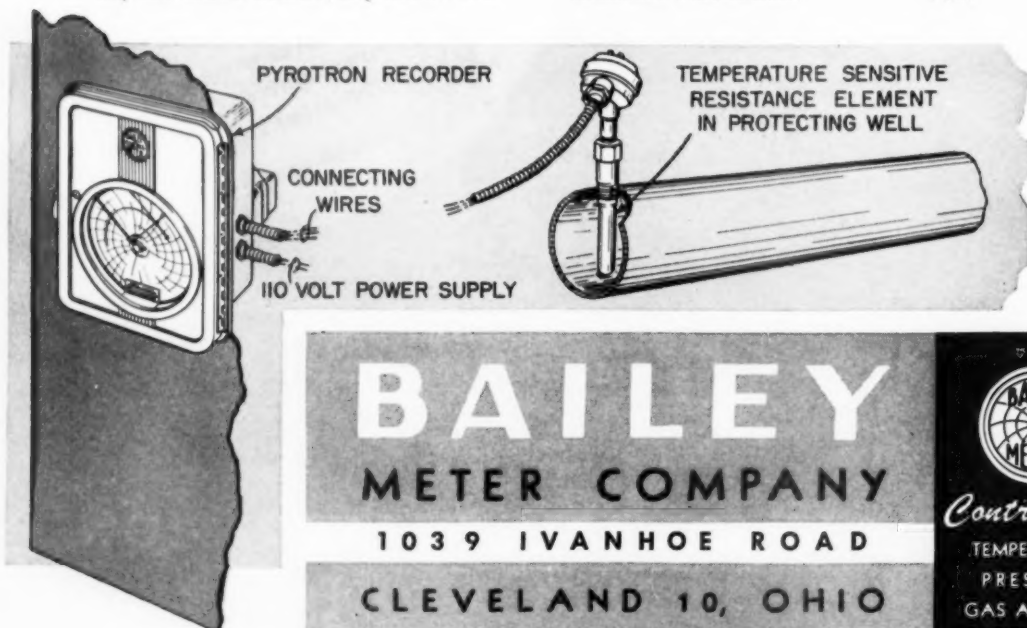
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*Controls for*  
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# These Five Pulverator Features Help

# REDUCE AGLIME COSTS



## 1. SQUARE HIT

A square hit is the most powerful breaking blow. *Pulverator* hammermills are designed to utilize this important principle of impact crushing. Feed is hit squarely by flat hammers.

## 2. MULTI-IMPACT

Hammers break and repeatedly smash the material squarely against involute breakers—resulting in a minimum of wear on breaker plates. *Pulverators* may be operated with or without grate bars and at various speeds.

## 3. HIGH PRODUCTION

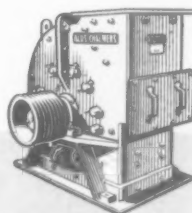
The multi-impact principle produces more fines ahead of the grate bar section. With more fines passing the grate, you get high production at lower cost. Also — power requirement and maintenance are reduced.

## 5. RENEWABLE PARTS

Liners, breaker plates, hammers, hammer bars and individual grate bars can be replaced separately. Hammers and grate bars are reversible.

## 4. QUALITY PRODUCT

*Pulverator* hammermills break material into a uniformly distributed cubical product. The product analysis can be varied by changing grate bar spacing and operating speed.



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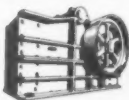


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Grinding Mills



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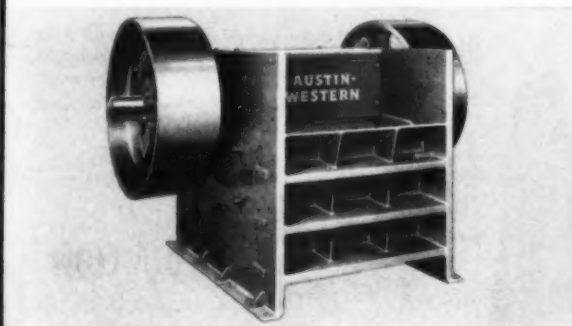
*Pulverator* hammermills are built in five sizes, capacities 2½ to 160 tph. Get more facts from the A-C representative in your area, or write for *Pulverator* Bulletin 07B6265A, Allis-Chalmers, Milwaukee 1, Wis.

A-4032

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STUDY THIS FACTUAL COMPARISON OF JAW CRUSHERS BEFORE YOU BUY ANY PLANT

COMPARE...	A-W	Make "X"	Make "Y"	Make "Z"
Oversize shafts of Chrome Vanadium steel, the toughest and strongest material available.	Yes	No	No	No
Bearings located so center line of bearing proper comes within side plate. Thus side plate bears thrust of crushing load.	Yes	No	Yes	No
Machined steel toggle plate for absolute protection instead of cast iron.	Yes	No	No	No
All bearings of anti-friction self-aligning type.	Yes	Yes	Yes	No
All jaws and cheek plates made of manganese steel for maximum life.	Yes	Yes	No	Yes
Steel plate crusher frame for high strength without weight of cast steel frame.	Yes	No	Yes	No
Total	100%	33⅓%	50%	16⅔%



Austin-Western 1036  
Roller Bearing Jaw Crusher



Austin-Western "101" Portable Crushing  
and Screening Plant with 1036 jaw crusher

The jaw crusher certainly is the *guts* of any crushing plant because it is the one unit that has to take constantly rough treatment. Also trouble-free operation of the jaw crusher is vital for profitable production. That's why it is so important for you to *compare* jaw crushers carefully before choosing from any crushing plants.

When you do, we are confident that factual evidence (see chart), will convince you that you will get better performance and longer life with an Austin-Western plant.

- For more facts on any of the above points or copies of our new booklets, please write: Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio, or your nearby Austin-Western distributor.

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GM DIESEL  
CASE HISTORY NO. 5310-1X



**OWNER:** American Zinc Company, North Friends Station Mine, Mascot, Tenn.

**INSTALLATION:** GM 4-71 Diesels powering 3 Koehring Dumptors. Units haul 8½ tons of rock and ore on 1100-foot run up 11½% grade to surface.



**PERFORMANCE:** GM Diesel-powered units help 20-man crew produce 500 tons of ore per day. Use of rubber-tired equipment cut cost of access shaft construction by 70%.

It Pays to STANDARDIZE



## GM DIESELS GO UNDERGROUND *to make trackless mining pay*

One of the world's most efficient small underground mines, the American Zinc Company's new North Friends Station mine is proving the economy of trackless operation. With a fleet of three GM Diesel-powered Koehring Dumptors handling the haulage, the mine is producing 500 tons of ore per day—about 25 tons of ore per man-shift. Mine Foreman Bill Armstrong says: "These units run along month after month with almost no repairs. Our costs are much less than we expected."

General Motors 2-cycle Diesels are just as much at home underground as on the surface. Two-cycle operation with uniflow blower scavenging

gives more complete combustion of low-cost fuel for higher efficiency and cleaner exhaust. Used with exhaust scrubbers and adequate ventilation, mine air stays well within permissible limits. And two-cycle operation means faster acceleration, quicker response to controls, faster haul cycles for increased production.

There's a GM Diesel for every kind of mining job. Specify GM Diesel power in *your* equipment. It will save you money.

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Single Units... 16 to 275 H.P. Multiple Units... Up to 840 H.P.

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## Selling the Farmer on Cost Reductions Through Liming

**R**ECENT EVENTS with respect to the federal soil conservation program have greatly accelerated the emphasis on the need for the promotion of sales by producers of agricultural limestone who seek to protect their investments and improve their outlook for future markets.

Those who have had a sound merchandising program through the years have fared much better this past year than those who have depended mainly upon government assistance to farmers for their sales. The comparative records are such that all producers should be inspired to greater effort in the promotion of sales and the building of acceptance for their product.

This great need for action comes at a time when the farmer's income has dropped some fifteen percent and when there is growing competition for his dollar. And, with surpluses in certain farm products, the appeal to increasing crop production as such through liming has lost some appeal. The question is what should be the most effective approach in merchandising, in order to overcome these apparent obstacles?

There is still another obstacle to consider and that is the pricing practices that prevail for liming materials. Prices are far too low for a product that will yield so much proven return to the farmer, and they certainly make difficult the kind of promotion program that is needed.

### Liming for Nutrition

The cheapness of agricultural limestone has prejudiced many a farmer against its increased use. Not only is the price low but many farmers undoubtedly believe it is only worth one-half the cost, since the government has paid half the price and because it has not been sold on its true merits. With a government program that has fixed prices so low and all the emphasis on the correction of soil acidity as liming's main function, it is small wonder that liming hasn't gained more esteem.

Its nutritional values and its many other contributions to farming efficiency, which have largely been overlooked, should be made the nucleus of a sales program which could be very effective in establishing limestone as a really valuable product and in commanding a price to sustain such merchandising effort.

The farmer is in a price-cost squeeze but, like any other businessman under such circumstances, will be receptive to ideas which reduce unit costs, if they be presented factually. Why not stress how liming will increase the efficiency of farming, to offset decreased farm income? That is talking

dollars and cents, and there are many virtues from liming that may be interpreted to prove how limestone will substantially increase per acre yield, improve quality of crops and cut unit costs.

As Dr. Wm. A. Albrecht points out in this issue, the idea of fighting soil acidity needs to be forgotten and, in its place, the real service of liming to correct the soil's deficiencies in calcium and magnesium and so building it to a high state of fertility, needs recognition. He contends that liming constitutes a major fertilizing performance.

### Saving Fertilizer

Other recognized agronomists have suggested the role of liming in reducing the costs of commercial fertilizers, which can be worth many times over the cost of liming. It has been demonstrated that plenty of calcium in the soil is the best remedy against excessive consumption of much more expensive potash by growing plants. That liming to pH 6.5 or higher will convert otherwise unavailable phosphorus into readily usable calcium phosphate has been proven. The rate of phosphate conversion may be accelerated to great benefit by liming to pH 7 in most heavy soils, thus speeding up the use of phosphate. Should small amounts of borax and manganese sulfates then have to be added as a corrective when soil is thus "over-limed" that would be a small penalty for the savings realized.

Protein-building nitrogen is a plus value from the air that may be realized from liming to grow good legume crops, later to be plowed under and used like commercial fertilizer. That this saving can far more than offset the cost of liming is another point to prove that liming improves farming efficiency.

Savings in seed, power costs with mechanized equipment, overhead, labor, protein concentrate additions to hay, etc., as the result of liming should all have appeal to the farmer.

These are but suggestions for one approach in meeting the problem of stiffer competition for the farmer's dollar. There are many other sales angles and progress is being made, as these efforts are being supported by more direct farmer contacts. Much more can be accomplished if producers will resist the urge to sell on price and allow more leeway to finance their strong selling story.

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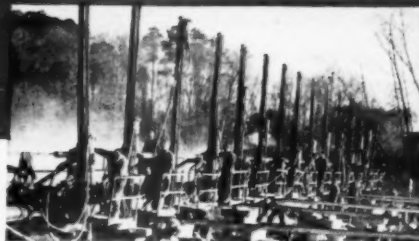
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### on the **NEW UMH DRILL WAGON**

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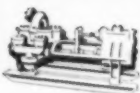


SINCE 1859

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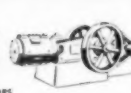
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# Rocky's Notes

NATHAN C.  
ROCKWOOD

## Magnesia in Hydraulic Cements

**A** SPECIAL SUBCOMMITTEE of the American Society for Testing Materials' Committee C-7 on Lime was recently appointed to explore possibilities in the use of pozzolans with lime for various purposes, of which soil stabilization and artificial hydraulic limes are obvious examples. In all probability in the case of soil stabilization, some clays that have proved to be much benefited by mixing with lime contain colloidal silicious and aluminous particles, which provide the desired chemical or colloidal reactions. For soils weak in such colloids it has been found by experience advantageous to add a pozzolan (fly ash thus far) with the lime to obtain the same soil stabilization results. A pozzolan is usually defined as any silicious or argillaceous material which will react with lime at ordinary temperatures in the presence of water or moisture.

Experience has shown also that lime used for soil stabilization does not have to be relatively high in calcium oxide (and/or magnesium oxide?) as is a requirement for most industrial uses of lime. Hence, a dolomitic lime answers the purpose very well, and even one fairly high in the usual impurities (mainly silica and alumina). However, if we attempt to evaluate the magnesia content of a lime as an active ingredient it is found that there are practically no experimental data of recent origin on the chemical reaction between magnesia and silica and/or alumina—at least no data known to members of the subcommittee now investigating the subject. Magnesia in portland cements has been considered "poison" ever since modern methods of making cement were introduced; and to justify this low opinion of MgO it is at best commonly reputed to be of no value in contributing cementing properties.

### Good Old Hydraulic Cements

If one takes the trouble to study some of the early literature on hydraulic cements, it becomes quite clear why this prejudice against magnesia arose; and there is not the slightest doubt that some very excellent hydraulic cements were made, and a few are still being made, of argillaceous limestones high in magnesia. Some of the early European and American portland cements also were much

higher in magnesia than present specifications permit. It was only after the use of rotary kilns became universal that purchasers of cement began to demand a low limit on the amount of MgO in the product. Many of the early American natural cements were made from argillaceous limestones high in magnesium. That these cements have often given results superior in durability to many modern portland cements can be shown readily enough by examining the records of existing structures in which they were used. Such a list is found in Uriah Cummings' "American Cements," published in 1898, a copy of which has recently come into our hands through the kindness of a friend who knows of our interest in the subject.

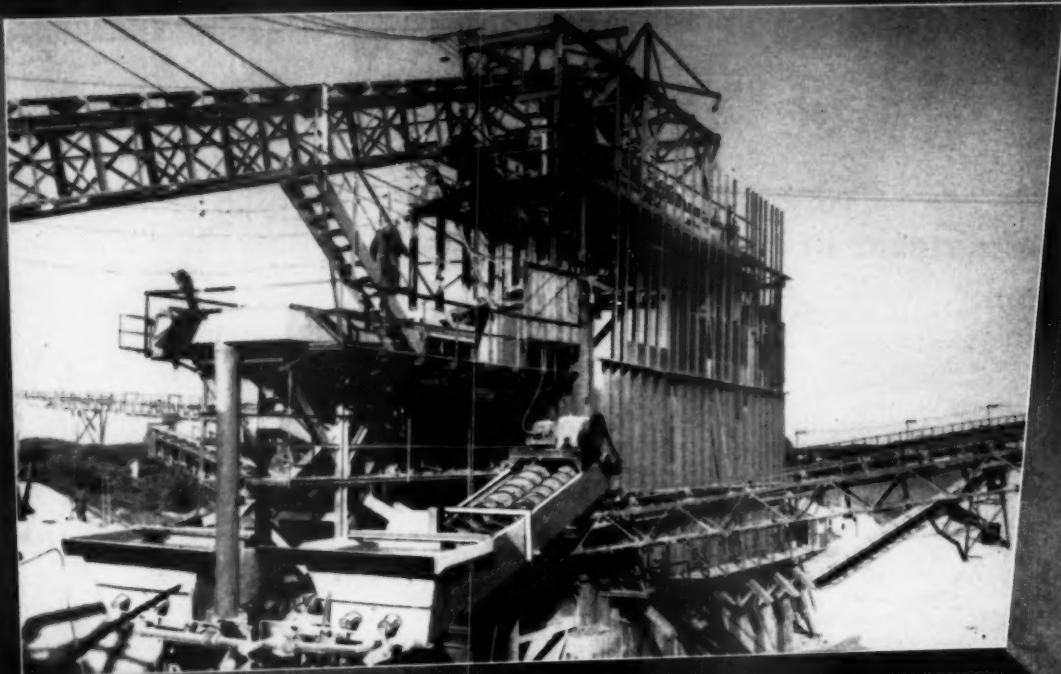
Some of these old American natural cements and their CaO and MgO contents were as follows: Howard, Cement, Ga.: CaO, 48.18; MgO, 15.0 percent; James River, Va., 49.53 and 13.78 percent; Akron, N.Y., 40.68 and 22.0 percent; Mankato, Minn., 36.31 and 23.89 percent; Milwaukee, Wis., 36.08 and 20.38 percent; Rosendale, N.Y., 33.23-37.59 and 18.0 and 15.0 percent. It will be noted that all of these cements had more than 13 percent MgO (about three times specification limits for portland cements), and several over 20 percent; yet all were used extensively and satisfactorily for important structures that have given a good account of themselves for these sixty-odd years and more. For example, the Howard cement was used for two bridges across the Tennessee River at Chattanooga, which presumably are still in use; James River cement was used extensively in the construction of the water-works of Richmond, Lynchburgh, Staunton, Charlottesville, Lexington and other Virginia cities; Akron cement was used for the piers and foundations of the high level railway bridge at Poughkeepsie, N.Y., across the Hudson River, which is still in service as everyone going or coming from New York City by the River route can see; the Akron cement was shipped as far west as Fulton, Ark., for hydraulic and bridge structures, and was used for the first concrete water-works tunnel under Lake Michigan at Chicago; Mankato cement was used for bridge piers and foundations across

the Mississippi River at Redwing, Minn., and Plattsmouth, Neb., and was shipped as far west as San Bernardino and Riverside, Calif., for irrigation works; Milwaukee cement was used for the original U. S. Government locks at Sault Ste. Marie, Mich., since of course mostly replaced by larger structures, and for the Chicago and Great Western R. R. bridge over the Mississippi River; Rosendale cement, the best known and most valued of all American natural cements, was used for construction of the Brooklyn Bridge piers and towers, and the masonry Washington Bridge across the Harlem River, New York, existing public buildings too numerous to mention, and for U. S. Army Engineer structures, the whole length of the Atlantic Coast; some work even in San Francisco harbor was done with this cement. The Portland Cement Industry's erstwhile slogan "Concrete for Permanence" could well have been based on the durability records of some of these structures.

### Ancient Literature on Magnesia

One of the earliest and most thorough researchers on hydraulic cements was L. J. Vicat, a French engineer who did his major work in the first quarter of the 19th century. We have an English translation of his "Treatise on Calcareous Mortars and Cements" published in 1837. In this the translator [Capt. J. T. Smith of the British Madras (India) Engineers] states: "In some excellent specimens of very old mortar, magnesia was found to exist in considerable proportion." Capt. Smith also comments on Vicat's endorsement of magnesia as a cement raw material as follows: "I found that 100 grains of fresh calcined magnesia powdered while warm, and immersed in water, had in 20 hours gained 18½ grains in weight, and after 3½ days; immersion had combined with very nearly the whole of their saturating dose of water (the weight being then 142.2, and some allowance for loss being necessary, owing to its having been dried and weighed repeatedly) and became converted into a true hydrate of magnesia. It is remarkable also, that as long as this reabsorption of water continues, the mass has a great tendency to set and harden, and requires to be continually stirred to prevent its doing so; but as soon as the saturation is complete, the powder becomes quite inert, and incapable of setting under water." Those are long and somewhat involved sentences, but if true it seems to us that they contain the germ of a very enlightening fact to explain some of varying expert opinions subsequently expressed regarding the role of magnesia in cements and limes. Vicat, himself, apparently considered magnesia in the same category as lime when used for an ingredient in hydraulic cements, and stated that a high content of magnesia was desirable for

(Continued on page 160)



*at Valley Sand & Gravel Co.,* **WAUKESHA, WISCONSIN**  
**EAGLE WASHER-CLASSIFIER-DEHYDRATORS**  
**PRODUCE CLEAN, GRADED MATERIALS!**

Today's aggregate demands clean, classified sand—the correct proportion of coarse sand and fine sand. Eagle equipment does the job better, faster and at lower cost per ton.

The busy, modern plant of Valley Sand & Gravel Co., Waukesha, Wis., depends upon Eagle equipment to process their sand—a 36" x 25' double screw long weir unit and a 30" x 25' double screw long weir unit—both fed by a 20' water scalping tank—each producing a different gradation of material. The Eagle Equipment was readily added to this plant with no disruption. Valley's is a dry pit operation, but Eagle Equipment functions equally well where material is pumped.


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**EAGLE**  
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# LABOR RELATIONS TRENDS

## Filling and Not Filling Skilled Job Vacancies Under Union Contracts

By NATHAN C. ROCKWOOD

**A** COMMON PROVISION in union contracts concerns the filling of job vacancies; usually of course the union bosses want a hand in this. What happens then, in these times of keener competition and greater efficiency, when a vacancy occurs, and the employer decides not to fill it? That question has been answered, for one operation at least, by a board of three arbitrators, one chosen by both parties, one by the employer and one by the labor union. As is practically always the case, when the decision appears to favor the employer, the union-appointed arbitrator disagreed with the other two.

The case involved one of the Florida plants of the Victor Chemical Co. (presumably phosphate) where the work and circumstances probably parallel many operations in the rock products industry in general. The issue was an interpretation of contract clauses regarding the filling of job vacancies, and the assignment of certain duties so as to eliminate the need of one job vacated. The decision was made August 8, 1953, at Tarpon Springs, Fla., between the company and the local of the International Chemical Workers' Union (A.F. of L.).

### The Arbitrators' Report

What follows are parts of the arbitrators' report which decided the issue, after the two contending parties failed to reach an agreement, beginning with a statement of the principal grievance raised by the union representatives:

"That the job of 'Electrician Helper' be filled by posting and bidding according to the provisions of the agreement between the parties. That the Chief Electrician shall not perform work normally assigned to electricians.

"Mr. Davis, electrician first-class, quit, which left a vacancy in the job of electrician first-class. This job was posted and Mr. Wilcox moved up to it and received the rate for the job. The vacancy created by Mr. Wilcox moving up was filled by posting this job of electrician second-class to which Mr. Kleinfeld moved from his job in the storehouse. That left a vacancy in the job of Electrician Helper on April 28, 1952, which job has not been posted nor filled and is still vacant. The job should have been posted and filled according to Article IX, Section 9.

This vacancy in the job of Electrician Helper should have been filled as the job and its rate is listed in the contract. The company changed a condition of the contract unilaterally by not having this job filled.

"Mr. Brooks, the chief electrician, who is not in the bargaining unit did work normally performed by the first-class electrician on June 5 and June 6 and on June 9 he worked on the Waytroll automatic weighing machine. This is not in accordance with Article XVI, Section 2 of the contract: 'Supervisory or professional personnel shall not perform work ordinarily or regularly performed by employees except for the purpose of training or instructing, or in cases of emergencies when regular or other qualified employees are not available, or to safeguard employees, or where plant production is seriously affected.'

"Mr. Brooks also did work that should have been performed by the first-class electrician on June 19, about three hours, July 2 on the track hopper automatic sander, and June 3 on the water cooler in the furnace building.

"Since the existence of the vacancy in the job of Electrician Helper, two of the electricians in this department have to work together by not having a helper which throws more work on the electricians . . . The Chief Electrician does a lot of the work himself. If there were helpers in the department, the electricians could get away to do other emergency work.

### Company's Argument

"Mr. Kleinfeld was working in the storehouse and wanted to move out to get more pay. The company saw the need to train men for jobs. Mr. Kleinfeld later filled the job of Electrician Helper at the same pay he was receiving in the storehouse. He was told that he would be advanced when a better job was open if he proved himself competent by training. That was done before the present contract, at a time when no posting or bidding for jobs was required. When Mr. Davis left the job of first-class electrician, the job was posted and bid for. Then the job of second-class electrician was filled in the same manner.

"Two men were sufficient to perform the work in electrical maintenance and a helper was not needed. Three men have no place working in that department. Sometimes only

one man worked but not during this contract period. At the time of these two promotions, management considered the problem of manpower in that department and decided a third man or helper was not needed. In that department, only an electrician first-class is needed. Maintenance work in the plant is now being taken care of better with only two electricians than it was with three. The superintendent has the right to determine the number of men needed to fill jobs in the department. This right is given management by Article XII in the contract.

"The company now has more men in the maintenance group than normally, but this is not assurance that this condition will continue as the demand fluctuates. The company does not post jobs when vacated if no replacement is needed. During the last two years, the variance of men in classifications in the electrical department has been as follows: first-class—from none to two men; second-class—from none to one man; helper—from none to two men. During this contract year, there was one man in each class in the electrical department. The old contract did not call for posting job vacancies. The maintenance department had a variance in the number of jobs filled in the last two-year period as follows: First-class maintenance mechanic—ten to eleven; second-class—from none to five, which is a total variance of ten to fifteen; and the variance of mechanic helpers was from one to ten. There are today in the maintenance department a total of twenty-three: First-class—eleven; second-class—four; helpers—five.

"Mr. Brooks, the first-class electrician, performs work on instruments as no other man in the plant is qualified for this work. The work performed by Mr. Brooks on the cooler trouble was emergency. Plant production was seriously impaired. Mr. Brooks does not perform this work because the two electricians are tied up with other work, but because nobody else can do it.

"On a problem of this kind, it must be the right of management to decide the size of the working force. Management must meet price and competition. First-class electricians perform first-class work, and so on for electricians second-class and helpers. Management must decide when a vacancy does or does not exist. This could have been done by a reduction in forces and posting. Management was effectuating a reduction in force at a time when the helper's job was not filled. Mr. Kleinfeld has progressed to be able to do more kinds of work than when he was electrician helper. Mr. Kleinfeld is not a fully qualified electrician second-class yet. When work was reduced this year, the force was reduced. The plant operates for 16 hours a day without a chief electrician being present.

(Continued on page 154)

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# PEOPLE in the news

## A.C.I. President

CHARLES H. SCHOLER, head of the department of applied mechanics, Kansas State College, Manhattan, Kan., was elected president of the American Concrete Institute for 1954 at its 50th annual convention in Den-



Charles H. Scholer

ver, Colo. He succeeds Henry L. Kennedy, manager, cement division, Dewey and Almy Chemical Co., Cambridge, Mass. Frank Kerekes, assistant dean, division of engineering, Iowa State College, Ames, Iowa, was elected for a two-year term as vice-president. A member of A.C.I. since 1924, Prof. Scholer is at present serving on Committee 115, Research, and Committee 215, Fatigue of Concrete. He has also been a member of the board of direction and vice-president of the Institute. A graduate of Kansas State College, he was author of several papers which appeared in the ACI Journal, and in addition has co-authored papers on "Effect of Various Coarse Aggregates Upon the Cement-Aggregate Reaction," and "Use of Chicago Fly Ash in Reducing Cement-Aggregate Reaction," for the latter of which he received the Wason Research Medal in 1952.

## A.I.M.E. Committee

CARL F. CLAUSEN, manager of the manufacturing process section of the Portland Cement Association, Chicago, Ill., is chairman of the Cement, Lime and Gypsum Committee of A.I.M.E. for 1954. Other members of the committee are J. T. Ellerbeck, general superintendent, Utah Lime

and Stone Co., Grantsville, Utah; Dr. William E. Ham, acting director, Oklahoma Geological Survey, Norman, Okla.; J. F. Havard, vice-president, Pabco Products, Inc., San Francisco, Calif.; Bror Nordberg, editor, ROCK PRODUCTS, Chicago, Ill.; B. H. Puermer, assistant manager, processing machinery department, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.; C. D. Rugen, assistant chief engineer, Universal Atlas Cement Co., New York, N.Y.; H. L. Waldthausen, Jr., works manager, Blue Diamond Corp., Blue Diamond, Nev.; and E. I. Williams, president, Riverton Lime and Stone Co., Riverton, Va.

## On Board of Directors

HUBERT C. BROWN has been elected a director of the Glens Falls Portland Cement Co., Glens Falls, N.Y., to succeed Lowell R. Burch, who has resigned. Mr. Brown is president of the First National Bank of Glens Falls, N.Y.

## Sales Manager

A. J. McELRATH, formerly service engineer, has been appointed sales manager of Hermitage Portland Cement Co., Nashville, Tenn., succeeding E. W. McGovern, president in that position. A graduate of the University of Kentucky School of Engineering, Mr. McElrath has had 20 years of experience as a cement and concrete expert. He previously served with the Kentucky State Highway Department, the U.S. Engineer Corps and the Tennessee Valley Authority. He started with the company in 1947.



A. J. McElrath

## Sales Manager

LOREN C. BUTTON has been appointed sales manager of Superior-Marquette Cement Co., Portsmouth, Ohio, to succeed W. B. Carder, who has



Loren C. Button

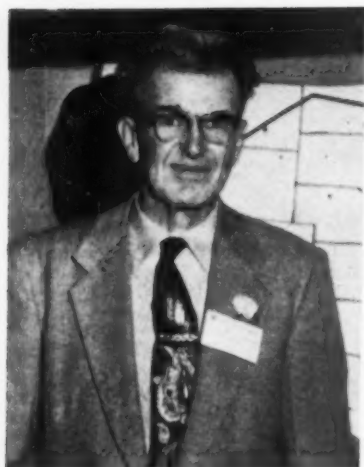
resigned. Mr. Button was formerly a salesman in the central division of Marquette Cement Manufacturing Co., Chicago, Ill., with which he has been affiliated for the past 12 years.

## Sales Representatives

JOHN S. CHASE, Chase Building Products, Inc., Dallas, Texas, is now representing the Bergen Machine & Tool Co., Nutley, N.J., manufacturers of equipment for the concrete products industry, in the states of Arizona, New Mexico, Texas, Oklahoma, Arkansas and Kansas. Mr. Chase, who has been connected with the concrete products industry for many years, is a past-president of the National Concrete Masonry Association. Roy Darden, Atlanta, Ga., who also is well known to the concrete products industry, has been appointed sales representative in the states of Alabama, South Carolina, Georgia and Mississippi.

## Director of Public Works

FREDERICK H. EDWARDS, formerly general superintendent of all quarries and distributing plants of the New Haven Trap Rock Co., New Haven, Conn., has been appointed director of public works of Meridan, Conn. Mr. Edwards has been a member of the board of public works under three Democratic administrations. Since last July he has devoted practically



Frederick H. Edwards

all of his time to promoting his inventions of machinery used in quarries and road building. In his new position he will have charge of the engineering, street, water and sanitation departments and the municipal garage.

### Universal Appointments

FRED T. WIGGINS has been appointed vice-president-commercial of Universal Atlas Cement Co., New York, N.Y. James C. McClure, formerly assistant vice-president, succeeds Mr. Wiggins as vice-president and general sales manager. Henry C. Schmielau, comptroller, has been named vice-president; Mac H. Hull, assistant vice-president, has been appointed assistant to the president; and W. Owen Lawrence, formerly manager of the Buffington, Ind., plant, has been named general operating manager.

Mr. Wiggins was born in Denmark, S.C. He attended The Citadel at Charleston, S.C., for two years before entering Duke University, where he received his A. B. degree in 1925. He joined the company in 1926 at Birmingham and served in the sales department until 1934, when he was appointed sales manager of the Birmingham territory. In 1944, he became assistant to vice-president, general sales, New York, and two years later was elected vice-president of sales,

western region, Chicago. He was named vice-president and assistant general sales manager at New York in 1949, and vice-president and general sales manager in 1951.

Mr. McClure, a native of Tipp City, Ohio, and a civil engineering graduate of Ohio State University, joined the company in 1927, serving as technical service engineer in Ohio until 1935, when he was promoted to technical service manager at Pittsburgh. In 1938, he was appointed district sales manager at Albany, N.Y., sales manager at Dayton in 1946, and assistant vice-president in 1952.

Mr. Schmielau, a native of Brooklyn, N.Y., joined the company in 1911 as clerk and served as bookkeeper, general auditor, assistant treasurer and assistant secretary prior to his election as a director in 1941 and as comptroller in 1942.

Mr. Hull was born in Portsmouth, Ohio, and attended Howard College, Birmingham, Ala. He has been associated with the company for 33 years, having joined as correspondent in 1921. He served in the sales department in Waco, Texas, until 1938, when he became district sales manager at St. Louis. In 1940, he was appointed assistant to vice-president of sales, central region, Chicago. Six years later he was promoted to assistant to vice-president, general sales, New York, and in 1952 became assistant vice-president.

Mr. Lawrence was born in Adamsville, Ala., attending Tulane University, Birmingham Southern College and the University of Alabama before joining the company in 1933 at the Leeds, Ala., plant. He left there to go to the New York office for two years as field engineer, returning to Leeds in 1942 as plant engineer, becoming assistant plant manager in 1944 and plant manager in 1945. He was made assistant plant manager at the Buffington, Ind., plant in 1948 and later was appointed plant manager.

### Plant Manager

WILLIAM F. CURTISS has been named manager of the Columbus plant of Universal Concrete Pipe Co., Columbus, Ohio. William A. Haley, formerly at the Rochester, N.Y., plant, has been made sales engineer of the



William F. Curtiss

Syracuse district, and George Pullin has been transferred from West Virginia operations to handle sales in Westchester County, N.Y. Mr. Curtiss, who joined Universal in 1945, has served as office manager and acting manager at Columbus.

### Named Superintendent

ELMER EVANS has been appointed superintendent of the Alpena, Mich., plant of Huron Portland Cement Co., Detroit, Mich. Formerly assistant superintendent of production, he succeeds William G. MacDonald who was recently promoted to assistant mill manager. Ralph E. Simmons, formerly assistant superintendent of personnel, has been appointed supervisor of personnel.

### In Panel Discussion

A. T. GOLDBECK, engineering director of the National Crushed Stone Association, Washington, D. C., recently participated in a panel discussion at Antioch College, Yellow Springs, Ohio, to examine the relationship between job experiences and Antioch's course for engineers. Several hundred employers and alumni attended the three-day conference to evaluate the college's study-plus-work plan, under which students regularly



Left to right: Fred T. Wiggins, James C. McClure, Henry C. Schmielau, Mac H. Hull, and W. Owen Lawrence

alternate classroom work with jobs secured for them. Antioch students have been employed as laboratory assistants at the National Crushed Stone Association since 1949.

### Elected Secretary

WILLIAM J. MCINTOSH, New York district engineer of the Portland Cement Association, Chicago, Ill., has been elected secretary of the Concrete Industry Board of New York City. Dugald J. Cameron, president of the Concrete Reinforcing Steel Corp., was re-elected treasurer, and Roger H. Corbetta, president of the Corbetta Construction Co., Inc., was re-elected chairman.

### General Manager

DWIGHT G. DEHAVEN, sales engineer for Smithwick Concrete Products, Portland, Ore., was recently promoted to general manager of the Eugene block plant and in charge of the southwestern Oregon area. Mr. DeHaven, who received his engineering training at Oregon State College, joined the company in 1950 and is widely known in the construction industry of Oregon and Washington.

### Named President

WILLIAM P. MCCUTCHEON has been named president of the Union Sand and Gravel Co., Huntington, W. Va. He was formerly secretary. Mr. McCutcheon, who succeeds the late Edwin P. May, has been with the company since 1925. Frank R. Clement continues as superintendent.

### Manages Kaiser Office

MAURICE NICHOLLS has been appointed manager of the New York office of Kaiser Engineers, Oakland, Calif., and will be in charge of the development of engineering and construction projects for the eastern seaboard area. A graduate of the University of Michigan, Mr. Nicholls has been consulting engineer in the Oakland office.

### Safety Council Chairman

JOSEPH E. PRICE has been named chairman of the newly organized Fort Collins Safety Council, Fort Collins, Colo. He has been active in safety work for several years, and directs the program of the Laporte plant of Ideal Cement Co., which has won many citations on its campaign to reduce accidents.

### Named Superintendent

JOHN R. KRINGEL has been appointed superintendent of the Haverstraw, N.Y., plant of the New York Trap Rock Corp., New York, N.Y. He has had 18 years of experience in construction and quarrying operations in the United States and abroad. He spent four years in the Philippines, one in Panama, and has recently re-



John R. Kringel

turned from a three-year construction assignment in Australia. He succeeds Greer Tomlins, who has retired.

### New Manager

GEORGE E. SPAULDING has purchased his partner's interest in Spaulding & Darwin. The name of the firm has been retained and offices have been moved to Oceanside, Calif. Robert Borden is office manager; E. Ambler, dispatcher, and David Davidson, master mechanic.

### Assistant Superintendents

SHERMAN D. GARDNER has been named assistant superintendent for power and special projects at the Fairborn, Ohio, plant of Southwestern Portland Cement Co., Los Angeles, Calif. He has been associated with the company for 24 years. Ernest A. Stute has been appointed assistant superintendent for operations. He was formerly master mechanic and will be succeeded by Francis B. Thomason. W. H. Strautman, assistant plant engineer, has been promoted to production and plant engineer.

### Receives Award

FRANK L. CHRISTY, president of the Marietta Concrete Corp., Marietta, Ohio, recently received the Distinguished Citizen Award of the Marietta Advertising Club. C. Kenneth Smith, president of the club, presented the award to Mr. Christy.

## OBITUARIES

ALLEN KISSAM, president of Kissam Builders' Supply Co., Orlando, Fla., died February 14 following an illness of a few weeks. He was 65 years old. Mr. Kissam, who with his brother, Edward Kissam, established the building supply firm in 1922, had been president since the death of his brother in 1952. He was active in the development and manufacture of con-

crete block and held patents for machinery used in the manufacture of concrete block. Mr. Kissam was for many years an active member of the National Concrete Masonry Association.

EDWARD W. SEEFLUTH, owner and operator of the Stevens Point Concrete Co., Stevens Point, Wis., passed away recently after an illness of two weeks. He was 65 years of age. Mr. Seefluth operated the plant for the past seven years. Prior to that he was a representative for the Medusa Portland Cement Co. for 23 years. Mr. Seefluth is survived by his wife and three daughters who intend to carry on the business.

BROR G. DAHLBERG, founder, former president and retired chairman of the board of The Celotex Corp., Chicago, Ill., died February 20 in his home at Miami Beach, Fla. He was 73 years of age. A native of Sweden, Mr. Dahlberg, together with a group of Minnesota business men and engineers, developed a process of making structural insulating board from bagasse, the fibrous residue remaining after the juice is extracted from sugar cane, and organized The Celotex Corp. in 1921 for the manufacture of this new board. Mr. Dahlberg retired as president in 1948 and as chairman of the board in 1951. He continued as a director of the corporation.

WILLIAM A. MOORE, former sales manager of the Uvalde Rock Asphalt Co., San Antonio, Texas, died recently at the age of 61. At the time of his death, Mr. Moore was a partner in the Williams-Moore Co., a building specialties firm in Lubbock, Texas.

ALLAN H. BUTZ, vice-president of the international division of Minnesota Mining and Manufacturing Co., St. Paul, Minn., died suddenly February 15 at Del Ray Beach, Fla., while vacationing with members of his family.

NORTON B. SMITH, vice-president of The Carter-Waters Corp., Kansas City, Mo., died March 13 after he became ill on his return home from a vacation in New Orleans, La. He was 53 years old. A graduate of the University of Missouri, Columbia, Mo., Mr. Smith had been associated with the firm for more than 20 years.

JOY CALVIN HELMS, founder and president of the Helms Concrete Pipe Co., Alexandria, Va., died March 6 at his home in Arlington, Va. Mr. Helms was also a director of the Virginia Manufacturing Association and past director of the Arlington Chamber of Commerce.

WILLIAM HAPPE, owner and general manager of the Happe Sand Co., Muncie, Kan., died February 24 at the age of 71.

BENJAMIN FRED BROOKS, senior partner of Brooks' Quarry, Kahoka, Mo., died recently after an extended illness. He was 59 years old.



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# industry news

## Cover Picture

THIS MONTH'S COVER illustration shows the Fry Coal and Stone Co., plant at Corriganville, Md. Operations



at the new plant started up in February, 1953. This is one of four major plants operated by this enterprising company, which has become an important factor in supplying agricultural limestone and aggregates in the areas of Pennsylvania and Maryland which it serves. A very active merchandising program is carried out in promoting the sale of agricultural limestone, and an agronomist is employed to provide customer service. The main office is located at Mercersburg, Penn. Other plants, all in Pennsylvania, are Lake Lynn, Williamson and Zullinger. The complete story about all this company's operations appears in this issue.

## New Phosphate Divisions

INTERNATIONAL MINERALS & CHEMICALS CORP., Chicago, Ill., recently announced a reorganization of its Phosphate Division. Under the new production and sales programs, International will have two phosphate divisions: The Phosphate Minerals Division, headed by George W. Moyers, vice-president, who has been in charge of the Phosphate Division; and a new Phosphate Chemicals Division, under the direction of Howard F. Roderick, recently elected a vice-president of International.

The establishment of the Phosphate Chemical Division as separate from the corporation's other phosphate operations was timed with the completion of the company's new Bonnie plant, near Bartow, Fla. Other phosphate chemicals operations include plants at Wales, Tenn. and Tupelo, Miss.

## Car Ferry Hauls Limestone

IN AN OPERATION unique to Great Lakes shipping, the car ferry Ashtabula, operated by the Pennsylvania & Ontario Transportation Co. between Ashtabula and Port Burwell, Ont., on Lake Erie, reportedly has been used for transporting Canadian limestone to steel mills in the United States. The limestone is quarried at Beachville, Ont., and loaded at Port Bur-

well by North American Cyanamid Co. Over 500 carloads thus far have been shipped, but extensive expansion of the Canada-to-United-States shipments are expected soon, due to the recent discovery of new limestone deposits near London, Ont.

Union Drawn Steel Co., Ltd., Hamilton, Ont., subsidiary of Republic Steel, has acquired 1100 acres of land near London, said to contain sufficient high quality limestone to supply Republic's open-hearth furnaces for several generations.

## To Develop Asbestos Property

AMERICAN SMELTING AND REFINING Co. reportedly will spend \$20,000,000 within the next few months to exploit asbestos deposits beneath Black Lake in Megantic County, Que. The deposit, believed to be the largest in the world, with an estimated 50,000,000 tons of ore, is owned by United Asbestos Corp. and will be developed jointly by the two companies.

## Production Increased

GLACIER SAND AND GRAVEL Co., Cowansville, Penn., reportedly has almost doubled its daily output since the installation of diesel power in the hauling unit used to transport sand and gravel from the pit to the washer. The unit formerly averaged 13 round trips per hr., moving 5½ to 6 tons of material per trip. A 3-cyl. G.M. diesel engine, installed in a model W 55 Koehring Dumptor, was said to have increased round trips per hr. to 20, while the amount of fuel consumed decreased nearly 50 percent. After 18 months of operation of approximate-



Diesel power installation in hauling unit increased round trips from pit to washer from 13 per hr. to 20, and 5½ to 6 tons per trip

ly 4500 hr., it was stated that the diesel evidenced no indication for need of repairs.

Glacier Sand and Gravel Co. began operations in 1949 with a daily output of 500 tons. Present plant production is now approximately 1000 tons per day. Owners and operators of the company are C. H. and Elmer Snyder.

## Safety Awards Dinner

DRAVO CORP., Pittsburgh, Penn., recently held its annual safety dinner, at which 44 individual awards were presented to operating divisions and units for their safety achievements during 1953. Dravo-Doyle Co. had the best safety performance among the



Carl B. Jansen (center), president, Dravo Corp., Pittsburgh, Penn., presents safety awards at annual safety dinner to (left) C. N. Hollingsworth, general manager, Dravo-Doyle Co., and (right) E. R. Hyde, manager, South Side ready-mixed concrete plant

corporation's independent units, while ready-mixed concrete truck drivers of the South Side plant achieved the best record among the Keystone Division operations. The award for The Contracting Division went to B. N. Parker, superintendent on pier construction projects at Montgomery and Wheeling, W. Va. Mr. Parker was also a recent recipient of the "safest superintendent" award from the Construction Association of Western Pennsylvania.

## Gypsum Plant

KAISER GYPSUM Co., Inc., Oakland, Calif., subsidiary of Permanente Cement Co., has started construction of its new \$4,000,000 gypsum board and plaster plant at Seattle, Wash., which will be the first such plant in the Pacific Northwest, and will serve Washington, Oregon, Idaho and Alaska.

The plant will consist of eight major steel and concrete buildings on a 9½-acre site adjoining the present plant of Permanente Cement Co. Completion of the plant is scheduled for

September, 1954. About 170 persons will be employed with an annual payroll of \$750,000.

Special "ground-breaking" ceremonies were attended by over 50 industrial, labor and city officials. Kaiser Gypsum representatives in attendance included Claude Harper, executive vice-president; Colin Campbell, sales manager; and Vic E. Cole, assistant operations manager.

### British Firm Acquires Canadian Gypsum Plant

WESTERN GYPSUM PRODUCTS, LTD., Winnipeg, Manitoba, was recently acquired by British Plaster Board, Ltd., London, England, for a reported purchase price of \$3,000,000, as reported by J. E. Spear, president and general manager of the Manitoba company. According to the announcement, there is to be no change in product, management, board of directors, or policy, as a result of the change of ownership.

Western Gypsum Products, said to be the largest producer of gypsum products in western Canada, reported gross sales of \$3,360,000 in 1953, including 64,000,000 sq. ft. of wallboard and 25,000 tons of plaster. The company's gypsum mine is located at Amaranth, Man., with plaster mills and wallboard plants at Winnipeg and Calgary, as well as mining properties in British Columbia.

British Plaster Board, Ltd., the new owner, is reportedly the largest gypsum products producer in the British Isles, owning or controlling plants in France, South Africa, Eire and Britain. This acquisition of the Canadian company by a British firm is said to be one of several recent indications of growing interest by the British in the industrial mineral prospects of Manitoba.

### Honors 25-Year Employees

OTTAWA SILICA CO., Ottawa, Ill., recently honored 33 active and retired employees who have served the company for 25 years or more. Thirty-one men and two women, headed by G. A. Thornton, company president, were feted at a banquet in honor of their service records. The men were presented with engraved gold watches and the ladies with diamond-studded,

white-gold watches. H. C. Thornton, vice-president, was master of ceremonies and introduced the guests whose combined total years of service to the company add up to over 1000 years.

### Cement Concern to Make Lightweight Aggregate

IDEAL CEMENT CO., Denver, Colo., has announced it is considering plans to build three new plants for the production of a new lightweight concrete aggregate recently developed by the company. The proposed plants would cost from \$750,000 to \$1,250,000 each, and would be constructed on sites near Denver, Colo., Salt Lake City, Utah, and either Omaha or Lincoln, Neb., according to Chris Dobbins, president.

Ideal Cement Co. reportedly has been experimenting with the new lightweight aggregate for the past 18 months. Later investigations and tests were conducted at the company's new \$500,000 research center which was opened last August. The aggregate under test is Pierre shale and is found in a 3000-ft. vein along the front range "hogback," extending from central Wyoming through Colorado and into New Mexico. Pilot plant runs using the new aggregate were reported to be successful.

### Safety Award

H. & R. STONE CO., Ridgeville, Ind., owned and operated by Sam Henry, was recently awarded a safety plaque by Bituminous Casualty Corp., Rock Island, Ill., in recognition of its outstanding safety record. At the time of the award presentation, the stone company had operated a total of 168,000 man-hours, over a 7-year period, without a lost-time injury. Presentation of the award was made by James O'Neal, safety engineer of the insurance company, at a special dinner ceremony.

### Venezuela Cement Loan

REPAYMENT of a \$3,000,000 loan five years in advance of its due date was recently made to the Export-Import Bank of Washington by the Venezuela cement firm, C. A. Venezolana de Cementos. In making the repayment, Eugenio Mendoza, president of

the cement company, stated that the credit extended permitted the company to expand the capacity of its Pertigalete plant five-fold—from 95,000 tons in September 1950, to 475,000 tons in September, 1953, bringing the capacity of its three plants up to 691,000 tons. Mr. Mendoza also revealed that his company had purchased more than \$12,000,000 worth of machinery from the United States.

### Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 17,769,000 bbl. of finished cement in January, 1954, as reported by the Bureau of Mines. This was 6 percent less than in January, 1953. Mill shipments totaled 11,143,000 bbl., a decrease of 18 percent from the January, 1953, figure, while stocks were 21 percent above the same month in 1953. Clinker production during January, 1954, amounted to 20,773,000 bbl., a decrease of 2 percent from the January, 1953, figure. The output of finished cement during January, 1954, came from 154 plants located in 37 states and Puerto Rico. During the same month of 1953, 18,856,000 bbl. were produced in 156 plants.

### Sand and Gravel Plant

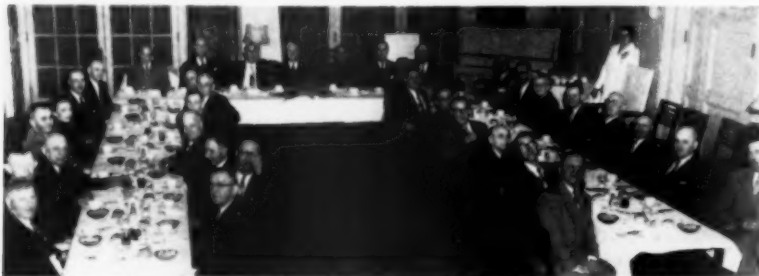
MAHOMET SAND AND GRAVEL CO., was recently organized as a division of Carl A. Bays and Associates, Inc., Champaign, Ill., to operate a sand and gravel plant near Mahomet, Ill. Leslie D. Vaughan will direct sales and manage operations of the new company. Ben Ellis has been named superintendent of operations, and Leroy Sawyer, superintendent of facilities and construction.

### Expanded Clay and Shale Association

THE EXPANDED CLAY AND SHALE ASSOCIATION was recently organized by representatives of 11 producers of expanded clay and shale, using the traveling grate method of lightweight aggregate production. The first major project to be undertaken by the newly organized group will be the sponsoring of a series of tests for establishing the fire-resistant qualities of this material. Officers of the association are: Glenn Barnes, Syracuse, N.Y., president; Starling A. Johnson, Salisbury, N.C., vice-president; Lucas E. Pfeifferberger, secretary; and Neil Christy, Marietta, Ohio, treasurer.

### Superphosphate Plant

INTERNATIONAL MINERALS & CHEMICALS CORP., Chicago, Ill., recently began operations of its multiple superphosphate and phosphate chemical plant at Bonnie, Fla., near Bartow. The plant, built at a cost of approximately \$15,000,000, has a capacity of about 100,000 tons per year. Uranium, produced as a by-product, will go to the Atomic Energy Commission.



Thirty-three employees of Ottawa Silica Co. are honored at special ceremony and banquet in recognition of their completion of 25 or more years of service with the company

## Cement Plant Expansion

NORTH AMERICAN CEMENT CORP., New York, N.Y., has started an expansion program at its Howes Cave, N.Y., plant, designed to increase capacity from 3000 bbl. of cement per day to 4500 bbl. per day. The first phase of the expansion program was the installation of a fourth kiln and enlargement of the kiln building. Other expansion facilities will include the addition of new coal mills, clinker coolers, coal bunkers, and dust-collecting equipment.

In order to supply additional raw materials for the increased cement production, the quarry facilities are also being expanded. The crusher and hammermills are being relocated and new equipment and stone storage facilities added. Expansion at the raw mill will include the addition of a new Traylor ball mill. New grinding facilities, increased storage for partly processed materials, and additional cement storage silos are also being planned.

## To Sell Gypsum Plant

THE NEWFOUNDLAND GOVERNMENT recently offered its gypsum plant at Humbermouth for sale to private industry. The plant is one of three built by the government. The others are a cement plant at Humbermouth, already sold to European interests, and a birch flooring and veneer plant near St. John's presently leased to private operators.

The gypsum plant, built at a cost of approximately \$3,000,000, has a capacity of 200 tons of gypsum per day. The wallboard and lath plant has a daily capacity of 250,000 sq. ft.

## Pavement Yardage

Awards of concrete pavement for the month of February and for the first two months of 1954 are listed by the Portland Cement Association as follows:

	Sq. yd. awarded	
	During February, 1954	During first two months 1954
Roads .....	1,007,013	2,859,029
Streets & Alleys .....	1,729,419	2,854,863
Airports .....	1,299,364	3,047,604
Totals .....	4,035,796	8,761,496

## Industrial Minerals Meeting

THE ANNUAL PACIFIC NORTHWEST Metals and Minerals Conference will be held at the Multnomah Hotel, Portland, Ore., April 29-May 1, 1954. Leslie C. Richards, mining engineer, who is serving as chairman for the industrial minerals sessions, advises that the Oregon Section A.I.M.E., this year's host to the conference, has scheduled a large part of the program for those whose particular interests are in the non-metallic minerals industry.

Among the papers to be presented are: "Production and Marketing of

Agricultural Limestone in the Pacific Northwest," by Thomas J. Waters, manager, Pacific Carbide & Alloys Co., Portland, Ore.; "Moving Industrial Minerals to Market," by John M. Poorman, vice-president, Poorman Heavy Hauling Co., Portland, Ore.; "Kyanite Resources of the Pacific Northwest," by Donald L. Masson, chairman, Department of Mining, Washington State College, Pullman, Wash.; "Exploration and Mining of Phosphate Rock near Soda Springs, Ida.," by G. Donald Emigh, director of mining, Phosphate Div., Monsanto Chemical Co., St. Louis, Mo.; "Diatomite Operation at Terrebonne, Ore.," by D. F. Dyrsmid, chief engineer, Dicalite Perlite Div., Great Lakes Carbon Corp., Waleria, Calif.; "Flotation of Del Monte Sands," by William E. Messner; and "Trends in Industrial Mineral Development in Idaho," by James McDivitt, professor of geology, University of Idaho.

## Oregon Lime Plant

KILNS for the new lime plant at Baker, Ore., Oregon's first lime plant, are currently being installed, with production expected to be started by the latter part of June, as reported by the Baker County Chamber of Commerce. The plant is being constructed by Anthony Brandenthaler and Associates. A 3-mile road to the lime quarry was recently completed. Initial production at the plant will be about 70,000 tons per year, utilizing approximately 140,000 to 150,000

tons of raw material per year. Total plant investment is estimated at \$1,100,000.

## Canada Cement Co. Report

CANADA CEMENT CO., LTD., Montreal, Que., recently reported that net profits in the 1953 fiscal year were 34.9 percent higher than for the previous year. All plants were operated continuously at full capacity throughout 1953, with production and sales 19 percent higher than in 1952.

The outlook for 1954, according to J. M. Breen, president, seems reasonably promising, though a moderate decline in construction activity may be expected. Continuing activity in power development work and industrial expansion, coupled with substantial home building and highway construction programs, are expected to help offset an expected decline in the defense construction program, with the over-all demand for cement in Canada expected to be only moderately lower than in 1953.

Capital expenditures in 1953 totaled \$3,878,399, most of which was used for completion of expansion programs undertaken during the past two years. Capital expenditures for 1954 are estimated at \$10,000,000, with the major portion to be spent for the rebuilding and expansion of the Fort Whyte, Man., plant. Important extensions and improvements to distributing plants at Quebec City and Toronto are also underway and scheduled for completion this spring.

## Coming Conventions

April 20-22, 1954—

National Industrial Sand Association, Spring Meeting, Boca Raton Hotel, Boca Raton, Fla.

May 3-5, 1954—

National Lime Association, Annual Spring Convention, The Homestead, Hot Springs, Va.

June 14-18, 1954—

American Society for Testing Materials, 57th Annual Meeting, Sherman and Morrison Hotels, Chicago, Ill.

September 20-24, 1954—

American Mining Congress, Annual Metal and Nonmetallic Mining Convention and Exposition, Civic Auditorium, San Francisco, Calif.

October 20-22, 1954—

National Industrial Sand Association, Fall Meeting, Hotel Plaza, New York, N.Y.

October 28-29, 1954—

American Concrete Institute, Regional Meeting, Statler Hotel, Los Angeles, Calif.

Oct. 28-Nov. 2, 1954—

North Carolina Concrete Masonry Association, Annual Meeting, On Board Swedish Liner "Stockholm" to Bermuda.

January 9-13, 1955—

National Ready Mixed Concrete Association, Silver Anniversary Convention, Miami, Fla.

January 9-13, 1955—

National Sand & Gravel Association, 39th Annual Convention, Miami, Fla.

# HINTS and TIPS HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

## Cab Protector

A COMMON SOURCE of accidents around a quarry involves the transportation and/or loading of large rock to truck units in the quarry. At an



Heavy screen protects the cab and driver during loading and hauling of large rock operation in the Southeast. Easton side-dump bodies are used on Ford chassis. The illustration shows how the truck cab and thus the driver are protected from large boulders loaded by the 2- and 2½-cu. yd. shovels used in the quarry operations.

## Simplify Material Handling

AT A RELATIVELY NEW crushed stone operation, the company also operates a black top plant. Aggregates obtained from the stone plant, adjacent to the hot plant, are trucked to three steel bins. The rear-dump trucks reach the bins by means of a ramp. Under the bins is a flat-running conveyor

belt. Three aggregates are involved. Two of the hopper bins have small apron feeders, each driven by U.S. gear motors, with the third bin having a gravity gate feed. Steel skirt boards prevent spillage from the flat conveyor belt which delivers to an inclined belt serving the bins over the black top operation. As indicated in the illustrations, the set-up is exceptionally neat and well designed.

## Preliminary Blending

AN EASTERN ROCK PRODUCTS OPERATION that produces sand for commercial, foundry, plaster and sand blast-



Draglines feed to portable field scalper, consisting of grizzly over steel hopper, which scalps out oversize

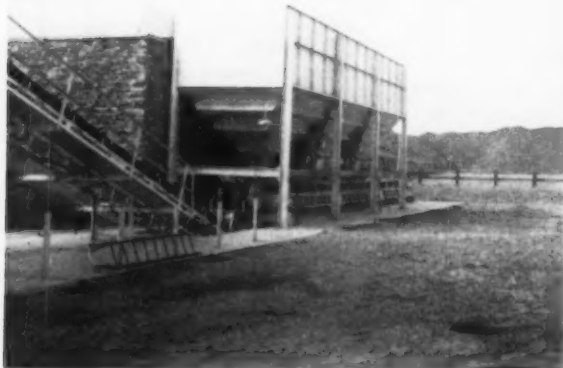
ing purposes has two draglines operating in different sections of the pit. The draglines feed to a portable scalp-

er which consists of grizzlies mounted over a steel field hopper. The basic idea of the system is to provide for a preliminary blending, at the pit, of the two different types of materials excavated by the draglines. The field hoppers deliver to portable field belts that converge to a common discharge point where the sand receives its first preliminary mixing. The illustration shows the Link Belt crane with an Owens clamshell bucket at one of the field hoppers. The field hopper is "inched" along by the crane when it is desired to move it. The amount of oversize scalped out is relatively small.

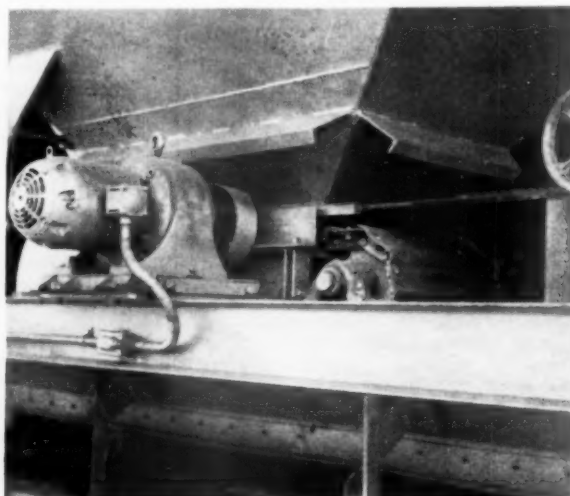
## Conveyor Installation

USE OF PERMANENTLY GREASED conveyor bearings has produced numerous changes in conveyor installations. The walkway for the "grease monkey" has been eliminated, which in turn reduces the amount of metal necessary in a truss to carry the load. Erection problems are also simplified, for the conveyors are often prefabricated and a crane can quickly set them in position. With conveyors of this type, modern rock products plants become individual units that are connected together by belt conveyors and, as such, become semi-portable, or portable plants permanently mounted.

The accompanying illustration shows four conveyors, with permanently greased idlers, which are in use at a new eastern crushed stone operation. The belt on the right carries fines scalped out ahead of the primary crusher. The upper belt can be used to return oversize to the primary reduction unit. The belt at



Left: Two of the hopper bins have small apron feeders, with the third bin having gravity gate feed. Flat-running conveyor belt under bins delivers to inclined belt serving bins over black top operation. Right: Apron feeder delivers to blending belt ahead of hot mix plant





Returns from the secondary crusher are chuted to belt serving primary crusher by a unique transfer arrangement

left serves the primary crusher, while the fourth belt is the return belt from the secondary reduction unit. The transfer assembly from this return belt to the No. 1 belt is a noteworthy bit of engineering.

### Drop-Ball Technique in Post Setting

AT A NEWLY CONSTRUCTED DAM in the midwest, graveled roads serving the project were hard-surfaced and otherwise improved so as to put them on a permanent-use basis. One phase of this work was the installation of adequate highway guards along the berms, especially at curves where banks were involved. This involved setting a considerable number of posts. The constructors, who apparently had observed or read of the use of drop balls in quarry work, improvised a post setter using the drop-ball technique, with the additional feature that the drop ball fell between guides.



Pile driver sets highway posts, by use of drop-ball technique

By means of a crane on crawler treads, the operators swung the portable pile driver out over the post (previously sharpened at one end) and, after a little maneuvering and a few taps of the drop ball, the post was set.

### Motor Overloading and Fluctuating Loads

INSTALLATION OF FLUID DRIVE reportedly corrected motor overloading and fluctuating loads on a hammermill in use at a large cinder block plant at Cincinnati, Ohio. Cinder



Fluid drive installation on hammermill eliminated overloading and fluctuating loads

Products, Inc., uses the hammermill to re-crush rejected block. With mechanical drive, heavy starting current was required to accelerate the hammermill, thus overloading the motor. Also, when fed coarse material, fluctuating loads caused further damage to the drive line.

The fluid drive, a Twin Disc Hydro-Sheave Model 12.2, was mounted on the output shaft of the 20-hp., 1750-r.p.m. motor. Now the fluid within the coupling reportedly absorbs the shock load of heavy starting and, through its "slip," permits the motor to accelerate quickly to normal r.p.m. without overheating. Fluctuating loads also are said to be smoothed out.

### Car Hauler

A TEXAS ROCK PRODUCTS OPERATION, faced with the problem of depletion on one side of the river where the

stationary washing plant was located, opened up a new deposit on the opposite bank. Transportation to the plant from the new pit involved a rail haul of about two miles, on standard gauge track (company-owned), followed by a long series of belt conveyors. Ten gondolas had to be delivered to the pit rail-system, and there were no switching connections with the railroads serving the area. The illustration shows how the ten gondolas, each having a 40-cu. yd. capacity, were delivered to the site.

### Ladder Innovation

THE SIMPLE BUT SAFE and serviceable ladder shown in the illustration is in use at a Florida stone quarry. It uses a minimum of steel as the



Narrow steel ladder with flared-out handrail offers both convenience and safety

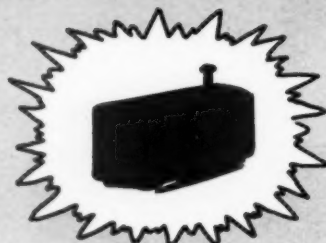
treads are only about 12 in. long. To put a vertical handrail on such a narrow ladder would mean a cramped position for the user, but by flaring out the handrail, as shown, the unit becomes easy to use and much safer than conventional ladders.



Improvised car hauler hauls 40-cu. yd. gondolas to pit rail-system

# NEW

# Machinery



## Crushing-Screening Plant

EBERSOL CRUSHER & ENGINEERING Co., 405 Atkins Ave., Lancaster, Penn., has developed a self-propelled crushing and screening plant with a patented two-stage jaw crusher utilizing a force feed motion obtained through the rotary motion of one jaw and a vertical coordinated movement of the other jaw. The two sets of jaws move in unison from the same eccentric shaft, which travels on four identical spherical roller bearings. A bank of coil springs allows tramp iron to pass through the crusher without injury to the machine. The coordinated movement of the jaws grabs the stone and crushes it as it pulls it downward. As the jaws open up, the crushed stone continues out and down and the jaws reach up again to catch stone for the next crushing.

The hopper and feeder are loaded by a power shovel or dragline bucket. From the feeder, the material falls onto the rotary screen or grizzly attached to the rotary part above the main jaw. The small stone or sand and small gravel pass through this screen and by-pass the crusher down to the main conveyor under the crusher. The large stone falls into the crusher and comes out onto the same belt which carries it forward into the "rotolift." The "rotolift" delivers the crushed and fine materials onto the short conveyor, which in turn delivers it on to the 4- x 10-ft. flat screen. The oversize from the top screen is returned to the crusher over a live chute attached to the moving part of the crusher. The fines and two other sizes are then delivered to three surge bins, each served by a loading conveyor.

A 6-cyl. diesel engine powers the plant, and V-belts are used to drive all the units of the machinery, including the self-propelling mechanism. When set to make 1½-in. screen size, and under, the capacity is 75 to 85 t.p.h.; when set to make 2- or 3-in.

stone, the capacity is 100 to 150 t.p.h.; and with a 50-50 sand and gravel, the capacity is 200 t.p.h. The crusher has a 20- x 42-in. opening, and will take a full 20- x 42-in. stone. A smaller size plant is also available.

## Crane-Shovel

OSGOOD-GENERAL, Marion, Ohio, has added Model 920, a 2-cu. yd. shovel, hoe, dragline, clamshell and crane combination machine, to its line of excavating and materials handling equipment. The unit incorporates a patented air tube clutch which provides metered air power for smooth operation. The deck is of one-piece, unit cast-steel construction, and the deck side frames are of cast steel. The standard shovel boom is a box type of high strength, low alloy steel,



Crawler-mounted, 2-cu. yd. shovel, dragline, clamshell, hoe and crane combination unit

and is 23 ft. long with an 18-ft. dipper handle. The independent chain crowd, with a two-piece chain, is self-adjusting to any boom angle, and the crowd and retract sprockets are mounted on the drum in two pieces.

A lattice type, all-welded boom with tubular lacing is used for crane, clamshell and dragline operations. It may

be either flange or pin-connected, the pin-connected boom being designed to fold. Inserts of 5, 10, 15 and 20 ft., and jibs of 10, 15, 20, 25 and 30 ft. lengths are available.

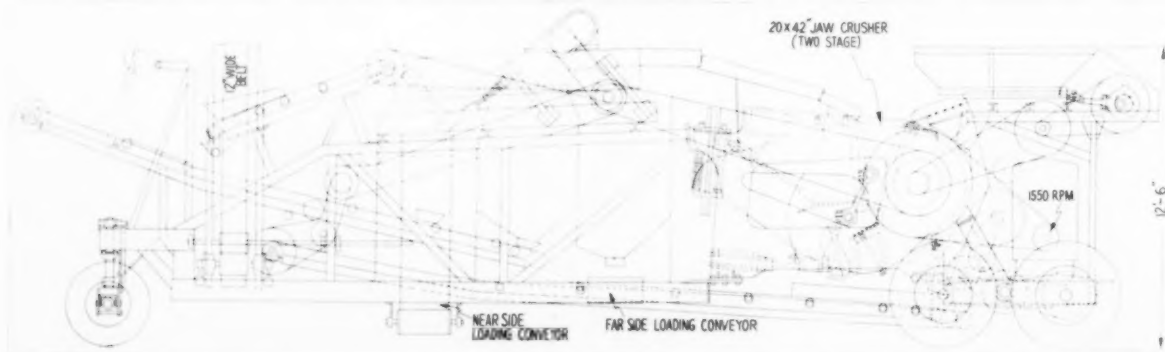
The side frames may be removed to reduce weight for highway transportation. The crawlers are 15 ft. long and 12 ft. 1½ in. wide overall, with standard 31-in. treads. The crawlers are also available with 36-in. treads. A GM 6-71 diesel engine is standard equipment and, torque converters are optional.

## Conveyor Belt Cover

RAYBESTOS-MANHATTAN, INC., Manhattan Rubber Div., Passaic, N.J., has developed the "XDC" conveyor belt cover which is designed to be abrasion and tear resistant, and which is an aid to provide longer belt life, even under heavily abrasive conditions such as encountered when conveying ore, rock, etc.

## Fabric Dust Collector

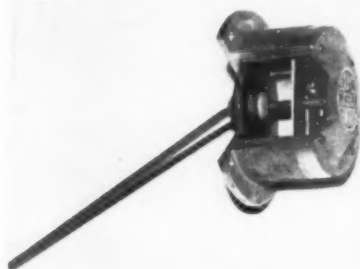
AMERICAN AIR FILTER Co., INC., Louisville, Ky., has developed the AMERjet dust collector, a reverse jet fabric collector designed for applications where fine particles are involved, or where the material must be collected in a dry state for reclaiming. The cleaning media is automatically reconditioned by a jet of high pressure air forced through the cloth in opposite direction to the flow of air being cleaned. Due to the continuous cleaning cycle, a constant pressure drop and a steady air volume at the exhaust points are maintained. The collector is available in two models, a weatherproof, housed unit where the cleaned air is discharged outside or to a process or where the fan must be located on the clean air side, and a model for use where the fan is installed on the air entering side and the cleaned air returned to the adjacent space.



Cross-sectional drawing shows details of two-stage jaw crusher

### Dry Product Level Control

SCRAYCO, 201 Greene Ave., Bound Brook, N.J., has brought out the Scrayco level control for dry materials. The device consists of a completely sealed housing which is bolted on the outside of a storage bin. It contains a switch, connected with a spring, adjustable for sensitivity, which in turn is hooked to a rod running through a rubber sphere on the side of the housing next to the bin wall. The mechanism may be placed on a duct or chute with equal results. The sphere, which may be natural or



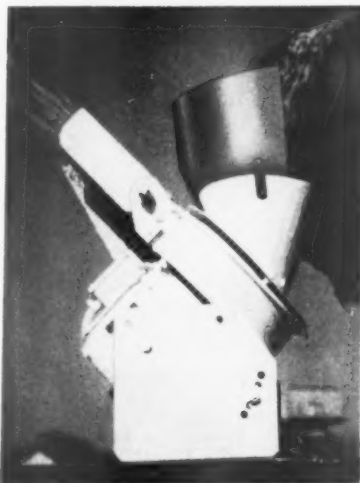
Cutaway shows dirt, dust and moisture-proof housing, spring and switch, and steel sensing probe which runs through rubber sphere into bin or chute

synthetic rubber according to the chemical nature of the dry materials with which it is in contact, is enclosed in a housing that separates the switch housing and the bin interior. The rod, or "sensing probe," running through the flexible sphere bends downward inside the bin, and may be angled to any degree from the horizontal, except to absolute vertical. The rod is the part which comes into contact with the flowing material and, moving freely through the flexible sphere, works the spring to throw the switch that cuts off the flow at the desired level. When the sensing probe goes downward, due to the weight of the materials reaching it, the electrical contact breaks and the flow ceases.

The sphere is designed to seal out dust, moisture and chemicals, and the sensing probe is of stainless steel. The level control is said to handle a range of materials including light, heavy, fine, irregular and coarse products, and material weights from 5 to 500 lb. per cu. ft.

### Sand-Gravel Piler

PETTIBONE MULLIKEN CORP., 4700 W. Division St., Chicago 51, Ill., has introduced the "Speedpiler" beltless piling machine which takes sand and gravel discharged from conveyor belts and throws it into piles or bins at a minimum rate of 40 t.p.h. When used in connection with a washing plant, it removes excess water from the material. The unit weighs approximately 550 lb., and may be suspended under the discharged end of a



Beltless piling machine takes discharge from conveyor belts and throws material at a minimum rate of 40 t.p.h.

conveyor, mounted on a platform or equipped with pneumatic tires on anti-friction bearing wheels. The trajectory is regulated by an adjustable discharge chute, and the receiving hopper can handle discharge from conveyor belts up to 30 in. wide. Special hoppers are also available, and the wear liners are replaceable. The Model M "Speedpiler" is direct motor driven with a 3-hp. motor. Standard equipment is a starter with push buttons and overload protection.

### Chrome-Ferrous Alloy

CALUMET STEEL CASTINGS CORP., 1636 Summer St., Hammond, Ind., has developed a chrome-ferrous alloy, called "ZeVeScal" W Series, for pug mill paddles, conveyor rollers, sand mill plows, etc. It is said to provide longer wear life under extremely abrasive conditions and reduce downtime caused by frequent parts replacement.

### Truck-Trailer Combination

EASTON CAR & CONSTRUCTION CO., Easton, Penn., recently announced tractor-and-double-trailer or truck-and-trailer combinations. These combinations employ standard side-dump truck bodies and semi-trailers. A converter dolly, equipped with a trailer axle, jumper hose, air line couplings and hitch, makes the combination possible. The trailers and truck bodies

are available in several capacities in lift-door, drop-door and pan-type designs. Drop-door units have integral hydraulic hoists and may be dumped anywhere. Lift-door and pan-type designs are dumped by an electric overhead hoist located at the fixed discharge point. With combinations comprised of the larger trailers, the total payload capacity can be over 75 tons, depending on the ability of the prime mover.

### Bottom Dump Trailer

ATHEY PRODUCTS CORP., 5631 West 65th St., Chicago 38, Ill., has brought out a 40-ton, 56-cu. yd. capacity, bottom dump hauling trailer, designated the Athey PH20 Coal Hauler, which is engineered to match the power and speed of the Caterpillar DW20 rubber-tired tractor. It was recently demonstrated before representatives of the press, engineers, and contractors. The unit, used with the tractor, travels at speeds up to 34 m.p.h. The trailer, with a frameless welded construction, is designed to eliminate dead weight and absorb the twist of high speed hauling. The single tires are interchangeable between the tractor and trailer. The body is wide and short,

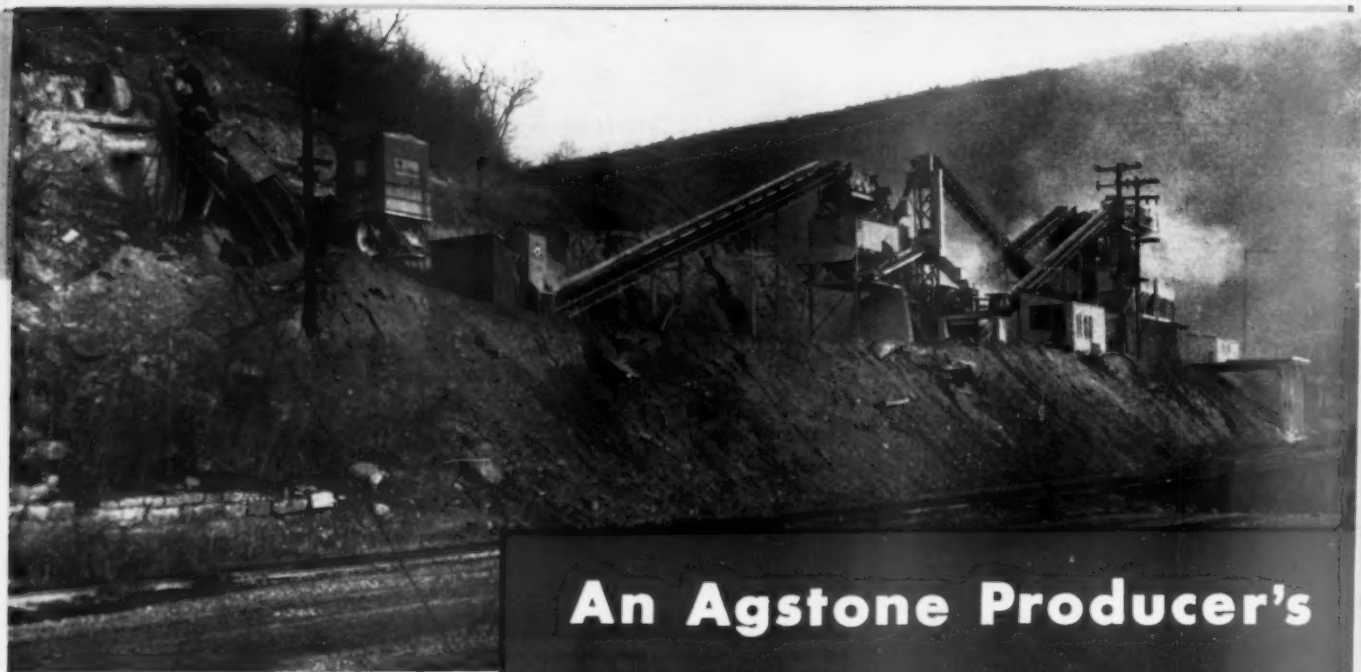


Trailer has a 56-cu. yd. capacity

and has a low center of gravity to hold down the loading height. The trailer is designed with a short wheelbase, to increase maneuverability and reduce the turning radius. The large bottom dump doors are said to open rapidly, discharging the full load into a hopper.



Pan-type truck-and-trailer unit may be used separately or in combination



Overall view of Corriganville, Md. plant.  
Cars loaded from ramp, to the right

## An Agstone Producer's To Building A

**I**N THE KEYSTONE STATE the name of Leonard S. Fry, Mercersburg, Penn., is synonymous with agricultural limestone, agricultural soil testing service to the farmers, high geared production methods, aggressive salesmanship all wrapped up with production of commercial stone from four plants, two of them new, along with a coal processing and hauling business that alone would keep most men busy and contented. Mr. Fry is rather a young man considering the nature and scope of his activities, and is the principal owner and driving force behind two companies, the Vesco Corp., and the Fry Coal & Stone Co. He is president of both companies. Operations are strung along the southern edge of Pennsylvania, a distance of roughly 110 miles, where the state joins with Maryland and West Virginia, with one operation being just over the Maryland line at

Corriganville, Md., a small community four miles north of Cumberland, Md. The offices and soil testing laboratories and repair facilities for mobile equipment are at Mercersburg, Penn.

### From Portables to Permanent Plants

His first venture into the crushed stone business was in 1938 when an old operation two miles north of Mercersburg was purchased. It was a small operation, producing about 150 tons per day. In 1943 a second quarry was started, and in the following year the Williamson plant, now a part of the Fry Coal & Stone Co., located about seven miles east of Mercersburg, was opened. In 1946,

the first portable plant was purchased, and in 1948 and 1949, a second and third portable was acquired. Later he sold two of the portables, retaining the third as a part of the Williamson operation. During 1953 permanent plants at Corriganville, Md., and at Lake Lynn, Penn., were set up. The Lake Lynn operation is located on a paved county road between Morgantown, W. Va., and Uniontown, Penn.

Western Pennsylvania, with the possible exception of the extreme northwest corner of the state adjacent to Youngstown, Ohio, has not had much representation in the crushed stone industry. After considerable scouting, the Lake Lynn deposit was found. Exploratory drilling started almost at once and within 30 days equipment started to move to the plant site. A 2-mile road connecting the newly found deposit was rebuilt which connects with the plant built alongside the paved highway. The operation north of Cumberland was his second plant to represent the crushed stone industry that serves the general area. The fourth operation, about one mile west of Waynesboro, Penn., is known as the Zullinger plant. It is a permanent plant of relatively small capacity. The Lake Lynn and the Williamson plants are the principal sources in the agricultural limestone business with special facilities provided to produce agstone and mine dust, however, the other two operations do produce some agstone as a secondary part of the plant operations.

Mr. Fry started his business career



Leonard S. Fry, president of the company, on the job

**Fry Coal & Stone Co., Mer-  
cersburg, Penn., operating  
several crushed stone plants  
in two states, has built up  
an increasing volume of  
business with a persistent  
program of sales promotion  
and service to its customers**

**By WALTER B. LENHART**

## **Approach Sound Business**

as a coal hauler. He hauls for industrial users only. Today he has a fleet of trucks making a 60-mile haul from his own coal cleaning and screening plant at Langdondale, Penn., delivering some 1200 tons per week, most of which goes to customers he started with almost two decades ago. In addition to this trucking service he has 14 agricultural limestone spreader trucks in operation, four of the trucks being company-owned. Agstone delivery service covers a radius of 50 miles from the producing plants. From the Williamson plant two counties are served in Pennsylvania and one county in Maryland.

Agricultural limestone sales are under the complete charge of Dean Fyock, a soil expert and agronomist. He is assisted by Henry Hunsberger who is also an experienced agronomist.

At Mercersburg, a soil testing laboratory with all modern equipment is maintained and soil testing service and scientific fertilizer advice is made available to the farmers. The laboratory will soon be housed in its own structure, and a third salesman will be added to the soil-testing service. These activities will be broadened to include practically all types of fertilizers and soil conditioners which will be sold along with the company's agstone.

### **Advertising Pays Off**

Advertising and other sales promotion for agricultural limestone are confined to newspaper ads in local papers, direct mailing of literature that originates in the Mercersburg office, and literature supplied through the National Agricultural Limestone

Institute. No radio or TV spots are used.

Sales efforts have paid off and will continue to pay off. Up to the time that the Federal Government was behind the agstone producers in their sales efforts, the company based their estimates on 40,000 tons of agstone per year. When support was withdrawn, this dropped almost overnight some 14,000 tons, but through the combined selling effort over 19,000 tons of this loss has been recaptured with every indication that it will climb higher than the original figure.

Commercial stone sales from the Mercersburg operations are handled through the joint efforts of Mr. Fry and Blane E. Yundt, executive vice-president of Fry Coal & Stone Co., and secretary-treasurer of the Vesco Corp.

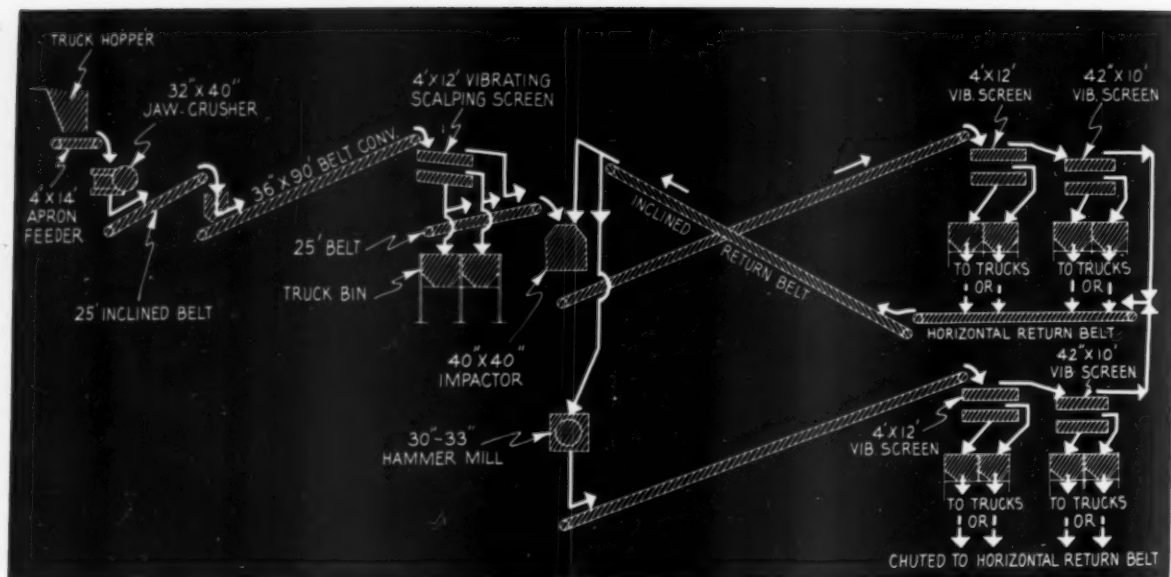
Sales for the Corriganville plant are handled exclusively by the Cum-



Looking down at Lake Lynn, Penn. plant. Conveyor belt, to the left, carries material to bins

Overall view of Williamson, Penn., plant. Agricultural limestone plant is in the background





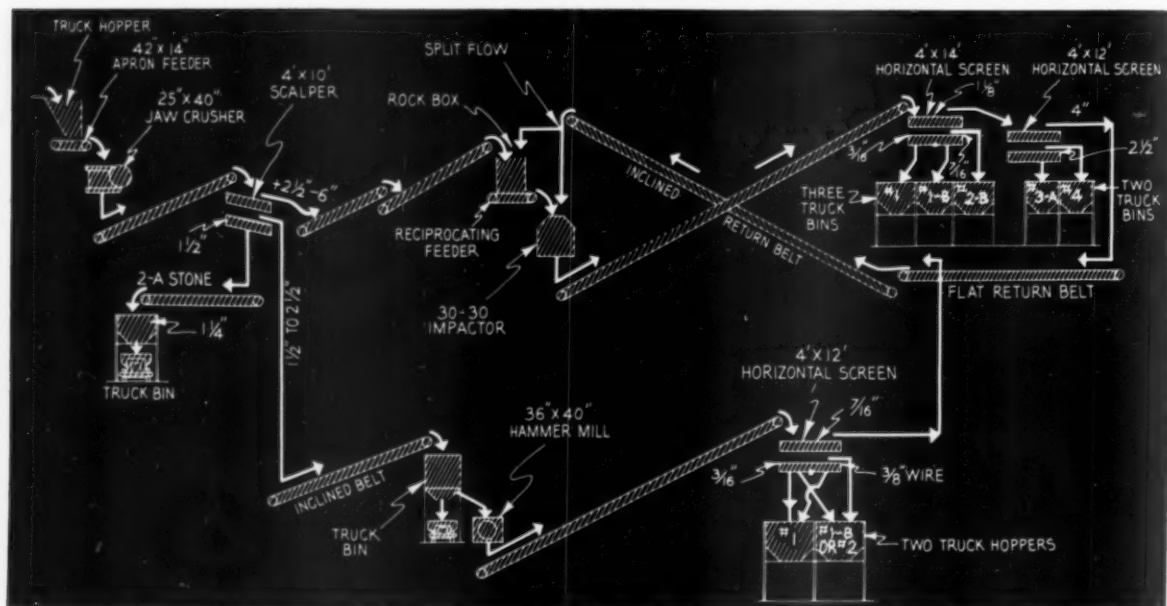
Flowsheet of crushing, screening and bin facilities at Corriganville plant

berland Cement & Supply Co., Cumberland, Md., whether by truck or for rail shipment. At the Lake Lynn plant, sales are under the management of W. M. Chambers who not only contacts the local builders, contractors, etc., but makes periodic calls on the farmers in his area, and on the coal operators who use limestone dust as a safety measure in the numerous coal mines surrounding the plant.

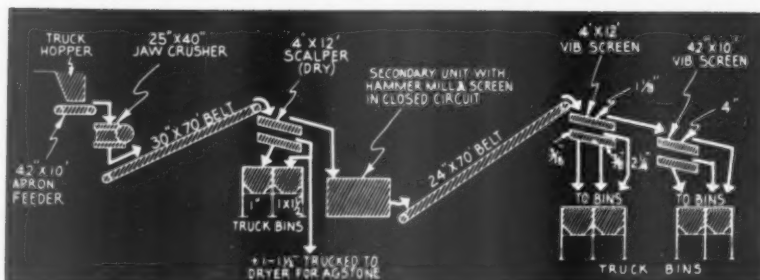
At the Lake Lynn operation agricultural limestone is produced in a separate plant from that which produces the commercial stone. The plant is located below the brow of a ravine with a 4- x 28-ft. oil-fired rotary dryer mounted near the rim. Trucks

deliver to a hopper under which is a reciprocating feeder serving an inclined belt conveyor to the dryer. Dried rock is received by a 150-ton capacity bin. A Syntron electrically-vibrated feeder delivers the material to a Bradley Jr. pulverizer that is largely used to process agricultural limestone. A table feeder serves a second pulverizer unit, a Bradley-Griffin mill, which produces either mine dust, or agstone. Screw conveyors and bucket elevators are used for intraplant transportation with two 150-ton capacity steel silos available for finished materials. Mine dust, packed on a St. Regis packer, using paper bags, is kept on hand at all times. Four spreader trucks are used.

The agricultural limestone production facilities at the Williamson plant are somewhat similar to the Lake Lynn operation. This plant has a 5½- x 24-ft., oil-fired dryer and three Bradley Jr. pulverizers. Mostly minus 1-in. crusher run is fed to the dryers, and on dried rock each Bradley mill produces about 8 t.p.h. to Pennsylvania specification sizes (98 percent passing 20-mesh). Maryland calls for slightly coarser agstone than the Pennsylvania specifications. The Bradley pulverizers operate in open circuit. No mine dust is produced at this operation. The three silos for finished agstone each hold 150 tons. At times all 14 spreader trucks operate from this plant. The spreader units are



Flowsheet of crushing, screening and shipping facilities at Lake Lynn plant



Arrangement of portable crushing and screening units at Williamson plant

Highway, Baughman and Evenspread units. One of the Bradley mills is driven by electric motor, and the other two are driven by individual Buda diesel units. About 30 company-owned trucks are maintained at the repair garage located at Mercersburg.

### Lake Lynn Operation

The quarry at Lake Lynn is about two miles from the crushed stone plant with the haul down-grade in favor of the loads. Considerable stripping is involved which averages about 30 ft. Most of the overburden is removed during the winter months. The quarry started using a single face about 60 ft. high, but this is being changed to a two-bench system with 32 ft. of rock being taken from the upper bench. Primary drilling is with a Mayhew rotary type that drills a 5 1/4-in. hole using Grumer tri-cone bits. The Mayhew drill was developed for the oil industry to be used in seismograph and prospecting service. It is a very simple, compact and highly mobile unit. The drill and 300 c.f.m. Gardner-Denver compressor are mounted on the deck of a F-800, two-axle, "Big Job" Ford truck with a power take-off for the compressor and the drill. The drill is quickly spotted and is supported on rubber-tired wheels. It drills at Lake Lynn around 15 to 20 ft. per hour with the best time being 275 ft. in 12 hours. From 800 to 1000 ft. of hole is obtained per bit. Because of its high mobility, this drill does practically all of the drilling for two of the four quarries working two shifts per day shuttling back and forth as required. The holes are load-

ed with 40- 60-70 percent Trojan dynamite, and exploded with DuPont electric delay caps.

Loading in the quarry is with a 1 1/2-cu. yd. Koehring 605 powered with a D-13,000 Caterpillar diesel. Five Euclid 22-cu. yd. capacity, rear-dump trucks are used to haul average loads of 27 1/2 tons to the plant. One of the Euclids is a TD-36 equipped with an Allison torque converter and the other four are TD-46 units and have water brakes (hydro-retarders) made by the Parkersburg Rig & Reel Co. A Buckeye crane operates a 4000-lb. Cape Ann drop ball for secondary breakage in the quarry. An HD-15 Allis-Chalmers tractor and dozer is also available for miscellaneous uses around the quarry. Other power shovel equipment includes a 3/4-cu. yd. Marion currently being used for stockpile reclaiming at the plant. An Adams grader is used to maintain haulage roads.

The Lake Lynn stone is classed as a Greenbrier limestone with the following typical analysis:

Silica	4.49 percent
FeO	.87 percent
Al <sub>2</sub> O <sub>3</sub>	.17 percent
CaO	48.27 percent
MgO	2.45 percent
CaCO <sub>3</sub>	88.14 percent
Sp. gr.	2.67

The Lake Lynn crushed stone operation is essentially a permanent plant although the primary crusher was a portable unit but is now mounted on solid foundations. It is driven by a D-13,000 Caterpillar diesel, but all the rest of the plant operates from



Dean Fyock, company agronomist, in a corner of his laboratory

purchased power. The plant comprises nearly all Cedarapids equipment. The general layout of the plant was designed by Mr. Fry with a considerable portion of the detailing being done by the engineering staff of L. B. Smith, Inc., supplier of the equipment. It was built entirely by the Fry organization with the engineering being done by this L. B. Smith organization. The plant operates dry and has a nominal capacity of 180 t.p.h.

The flow of stone through the plant is rather unique. Following the 25- x 40-in. primary Cedarapids crusher is a 4- x 10-ft. two-deck scalper screen. The crusher is fed by a 42-in. x 14-ft. C. R. apron feeder. The scalper screen takes out three products that stream away from the unit via three separate belt conveyors. The scalper has a top deck of 2 1/2-in. wire and a 1 1/2-in. wire lower deck. Fines from the lower deck fall to a belt conveyor which delivers to a truck bin, and is sold as Pennsylvania 2-A modified. If the pit run is free from any inclusions, the minus material can go along with the 1 1/2-in. to 2 1/2-in. stone from the top of the lower deck. This size stone is sent by belt



Left: Dumping stone at Lake Lynn quarry to primary jaw crusher. Right: Bins to the left are on hammer mill side; bins to the right are on the impactor side. Belt between bins returns plus stone to secondary reduction units



One of the spreader trucks operated by the Fry Coal and Stone Co.

conveyor to a truck bin that has a wide discharge chute starting well up from the side of the bin so that rock can be chuted to a 36- x 40-in. CR hammermill. Trucks can load from the same bin by means of a conventional withdrawal gate. The hammermill, that delivers to an off-bearing belt conveyor discharging to a 4- x 12-ft. horizontal screen over the bins, produces Pennsylvania 1, 1-B, and 2. This section of the plant constitutes the hammermill side, and any oversize from the screen from this side of the plant, and from the impactor side of the plant, to be discussed later, can be diverted to a flat running belt that starts the material back to the secondary reduction units.

The 2½-in. to about 6-in. stone from the top deck of the scalper is delivered via two short inclined belt conveyors to a reciprocating feeder that operates under a rock box ahead of a 30-30 Cedarapids impactor. The throughs from the impactor are sent by belt conveyor to two screens that operate in series and prepare Pennsylvania No. 1, 1-B, and 2-B, from a 4- x 14-ft. two-deck screen over three larger steel truck bins. The top fraction from the 4- x 14-ft. screen flows to a smaller screen, mounted over two smaller steel bins, which prepares the No. 3-A and No. 4 stone. Oversize from this screen, or, 3-A and No. 4 can be returned to the flat running belt that serves an inclined return belt to either the impactor or the hammermill, or both, for further reduction. The flow diagram gives more of the details of the installation. The steel bins each hold 30 tons for the smaller units and 40 tons for the larger.

Wear on the impactor has been quite nominal even though the silica content is approximately 5 percent. About 10 hr. per month of welding is required to keep the unit in good operating condition. The impactor uses two 60-hp. motors and the hammermill uses a 125-hp. drive motor.

All material is shipped by truck and weighed on a set of Howe scales. The Goodrich belts on the conveyors range from 18 to 36 in. width. Aside from the agricultural limestone spreaders, previously mentioned, all other trucking to points of use is by trucks not owned by the company. Ray Mills is plant superintendent at Lake Lynn and John Heinbaugh is quarry superintendent.

## Corrigansville Plant

**T**HE CORRIGANSVILLE, MD., PLANT of the Fry Coal and Stone Co. is now beginning its third year of operation, however, the newer plant started during February, 1953. The plant uses Cedarapids equipment throughout. Like many modern plants it consists of separate units, connected by belt conveyors, that are likewise unitized and could be classed as a semi-portable plant, permanently mounted.

The flow of materials through the plant is somewhat similar to the Lake Lynn operation, with only differences in sizes of the primary and secondary reduction units.

The quarry at Corrigansville is quite unusual as the limestone stratas are almost vertical and are well defined. The silica content ranges from a low of 4 percent to a high of 12 percent. Some 30 ft. of stripping is removed with a single bench of commercial stone that is roughly 100 ft. high. As the quarry expands, the face will reach a maximum of 330 ft. and 100 ft. benching will be practiced.

From 12 to 14 ft. per hour is drilled with the Mayhew drill in this rock, and the vertical seams do not present any serious drilling difficulties. The quarry is only a few hundred feet from the primary crusher with no unusual road conditions. A 1½-cu. yd. Koehring and a 1½-cu. yd. Northwest shovel load a fleet of six Koehring Dumpsters.

The general layout of the plant was made by Leonard S. Fry with Chief Engineer O. L. Borke of L. B. Smith, Inc., supervising the design details. The plant was built entirely by the staff of the Fry organization.

### Plant Operation

The plant operates dry, without cover. Belt conveyors are used entirely for intraplant transportation.

The idlers are greased for life. Finished material is shipped by truck and rail. The terrain is rather rough and confined, and the loading switch is about 30 to 50 ft. away from the bins, so truck service is relied upon to fill the railroad cars. The slightly inclined ramp from the bins to the point of dumping is practically level so a truck has only a short distance to travel to unload.

No special facilities at Corrigansville are provided to prepare agricultural limestone as a high percentage of the countryside is not predominantly agricultural. However, the plant does ship some agstone which is material screened out of the crushed stone. This is a minus 10 mesh material. While the area is not essentially agricultural, there is a considerable demand for commercial aggregate. The plant has a capacity of 200 t.p.h. One of the larger jobs is an Army Engineers flood control project in the Cumberland Valley designed to help protect the city of Cumberland, Md. One of the prime contractors on this job, the E. J. Albrecht & Co., Chicago, Ill., has a concrete batching plant adjacent to the quarry site.

The Koehring Dumpsters unload to a truck hopper serving a 4- x 14-ft. Cedarapids apron feeder that delivers to a 32- x 40-in. jaw crusher, which is driven by a 125-hp. motor. A short inclined off-bearing belt delivers the crushed stone to a longer inclined belt conveyor at right angles to the first belt. This conveyor discharges to a 4- x 12-ft. single-deck vibrating screen mounted over two 30-ton capacity steel truck bins. If the quarry run has any appreciable amount of inclusions, this material can go as 2-A modified. Otherwise it is a minus

(Continued on page 153)



Corrigansville quarry has high, vertical rock formation which is drilled with a rotary type drill

**Technical developments, plant operation, safety, legislation, public relations and merchandising stressed at Chicago convention of N.C.S.A.**



Ted Cooke, Lynn Sand and Stone Co., new president of the N.C.S.A., addressing the Manufacturers' Division luncheon

## Crushed Stone Producers Hold Well-Balanced Convention

**T**HE 37TH ANNUAL CONVENTION of the National Crushed Stone Association, held at The Conrad Hilton Hotel, Chicago, Ill., February 22-24, had a registration of approximately 1500. It was held simultaneously with the biennial exposition of equipment which was the finest and largest to date. A great number of operating men were present, attracted by the exhibition of machinery and equipment and because a full session was scheduled for discussion by operating men and equipment manufacturers. Two full sessions were set aside to provide ample time for inspection of the exhibits.

### Program

President H. C. Krause, Columbia Quarry Co., St. Louis, Mo., presided for the first general session which heard the reports on business conditions, those of the administrative director, engineering director, field engineer and concluded with an inspiring talk on sales.

G. D. Lott, Jr., Palmetto Quarries

Co., Columbia, S. C., presided for the operating session which had six scheduled talks, each followed by a discussion period.

Arthur Goff, Wallace Stone Co., Bay Port, Mich., presided for a session which heard the N.C.S.A. committee reports, one on percentage depletion, an illustrated talk on an English granite quarry and an address by Richard Thomas of the *New York Times*.

Bruce G. Woolpert, vice-president, Granite Rock Co., Watsonville, Calif., presided for the concluding session where talks were presented on legislative developments, public relations and the 1953 Indiana test road.

H. A. Clark, president, Consumers Co., Chicago, Ill., presided for the annual Greeting Luncheon and H. E. Rainer, general manager, Federal Crushed Stone Corp., Buffalo, N.Y., for the concluding general luncheon.

Meetings of the board of directors of N.C.S.A. and of the Manufacturers Division, were held the day preceding the convention and the Manufacturers

Division held its annual business meeting at a luncheon. Otto M. Graves served as chairman of the convention arrangements committee.

The 38th annual convention of the National Crushed Stone Association will be held at the Netherland-Plaza Hotel, Cincinnati, Ohio, the week beginning February 6. In 1956, the arrangement with the N.S.G.A. and the N.R.M.C.A. will be continued, to meet in consecutive weeks at the Conrad Hilton Hotel, Chicago, Ill., with the biennial exposition. The N.C.S.A. will meet the week of February 20, immediately following the conventions of the N.S.G.A. and the N.R.M.C.A. The 1954 midyear meeting of the board of directors will be held July 22 and 23 at The Homestead, Hot Springs, Va.

### Officers

T. C. Cooke, president, Lynn Sand and Stone Co., Swampscott, Mass., was elected president of the National Crushed Stone Association, succeeding Horace C. Krause, president, Columbia Quarry Co., St. Louis, Mo., who has served as president for 1952 and 1953. James Savage, treasurer; J. R. Boyd, administrative director; A. T. Goldbeck, engineering director; and J. E. Gray, field engineer were reelected.

Elected to the executive committee were A. W. McThenia, Acme Limestone Co., Fort Spring, W. Va.; G. D. Lott, Jr., Palmetto Quarries Co., Columbia, S. C.; Russell Rarey, Marble Cliff Quarries Co., Columbus, Ohio; Wilson P. Foss III, New York Trap Rock Corp., New York, N.Y.; H. C. Krause, Columbia Quarry Co., St. Louis, Mo.; H. A. Clark, Consumers Co., Chicago, Ill.; and J. Reid Callanan, Callanan Road Improvement Co., South Bethlehem, N.Y.



Left to right: Clarence Manion, luncheon speaker; Harry Clark, Consumers Co.; and Russell Rarey, Marble Cliff Quarries Co.

H. E. Rhodes, Nashville, Tenn., Sterling Tomkins, New York, N.Y., and Harold Williams, Boston, Mass., were re-elected honorary members of the board of directors, and Otho M. Graves honorary member of the executive committee.

### Social Events

Among social events were a cocktail party and buffet dinner, followed by dancing, and the annual reception and banquet to conclude the convention.

A delightful program of ladies entertainment was provided, for which Mrs. H. A. Clark, Chicago, Ill., Mrs. I. F. Deister, Fort Wayne, Ind., and Mrs. M. E. McLean, East St. Louis, Ill., served as hostesses. Mrs. Lillian Asmus was director of entertainment and a Ladies Headquarters was established where ladies could meet each morning for coffee and entertainment. A ladies "get-together" tea on Sunday preceding the convention, and a luncheon, complete with orchids and an excellent speaker, through courtesy of the N.C.S.A., were the principal scheduled events.

### Manufacturers Division

B. R. Maloney, E. I. duPont de Nemours & Co., New York, N.Y., was elected chairman of the Manufacturers Division at the annual business meeting, succeeding Irwin F. Deister, Fort Wayne, Ind. L. A. Eiben, Northern Blower Co., Cleveland, Ohio; Wayne W. King, W. S. Tyler Co., Cleveland, Ohio; and R. D. Ketner, General Electric Co., Schenectady, N.Y., were elected vice-chairmen.

Serving on the executive committee will be B. R. Maloney, chairman; L. A. Eiben; Wayne W. King; R. D. Ketner; Irwin F. Deister; and president T. C. Cooke, president of N.C.S.A. Irwin F. Deister, L. A. Eiben and B. R. Maloney will represent the Manufacturers Division on the N.C.S.A. board of directors.

New members elected to the board of directors are J. M. Hume, Pettibone Mulliken Corp., Chicago, Ill.; H. R. Stickel, White Motor Corp., Cleveland, Ohio; E. S. Gill, Gill Rock Drill Co., Lebanon, Penn.; and E. T. Eggers, American Steel & Wire Division, United States Steel Corp., Cleveland, Ohio.

Business matters included a report by retiring chairman Irwin F. Deister and the approval of resolutions thanking all concerned for a successful convention and exposition. During the year there was a net gain of four new members bringing the total to 105.

### Business Conditions

President H. C. Krause presented a summary of reports from the regional vice-presidents covering business conditions in 1953 and the outlook for 1954. Business on the whole was very good in 1953 and the year ahead is viewed with optimism. There was little change volume-wise, in 1953

as compared to 1952 except in certain areas. There was no change in most sections with a maximum increase of 8.3 percent in one area. The big section was in the Great Lakes area where volume increased up to 20 percent, due to increased demand for chemical-grade limestone.

Two regions reported that prices were up slightly, another reported a 5 percent increase, while prices held firm in other areas. The ratios of volume of demand to capacity ranged from 70 to 100 percent and the weighted average for the country is 80 percent. Improved production methods are reflected in these figures, resulting in increasing capacity while tonnage held fairly constant.

As to distribution of sales, the range was from 12-73 percent for highway construction, with the lowest figures in regions supplying chemical-grade stone. Railroad ballast ranged from 2-17 percent of sales, with an average less than ten percent. Building construction took 7-35 percent of

the tonnage, averaging less than 20 percent. Chemical and metallurgical use ranged from 1 percent in one region up to 70 percent in the Great Lakes area. Rip-rap took from zero to a maximum of 2 percent in one region only, and from 2-8 percent was the range reported for stone sold for miscellaneous uses.

No change in percentage of distribution of sales according to use is expected in 1954, with the exception of building construction which is expected to increase. Little change is expected in 1954 volume overall. A slight decrease is predicted in some regions and increases up to 4 percent increased volume in one area. Capacity to produce has increased through the industry largely due to improvements and better productivity in permanent plants. In some areas, the influx of portable plants has been substantial. Competition from slag is being felt by some producers and the drought in 1953 had considerable effect on many producers.

## Engineering Director's Report

**E**NGINEERING DIRECTOR A. T. GOLDBECK presented a very comprehensive report on engineering activities before the opening session of the convention. He started with a brief statement on the association laboratory facilities, which permit the performance of all necessary physical tests on aggregates, bituminous mixtures, portland cement concrete and on other materials involving the use of stone, and he then commented on activities in technical organizations which are considered very valuable to the crushed stone industry.

Among technical organizations in which the industry is actively represented are the A.S.T.M., A.C.I., Association of Asphalt Paving Technologists, the Highway Research Board, American Railway Engineering Association and others. The association has contributed papers to these organizations, is actively engaged in their

committee work, and has also been engaged in some of their administrative affairs. It is through these technical activities that the N.C.S.A. and its research work have gained much valuable prestige, said Mr. Goldbeck.

Research in the association laboratory under the direction of Research and Testing Engineer J. M. Rice, covering significant investigations in the form of research projects, was reported in some detail due to its important part in the total technical effort.

In order to bring out how the various projects originate and how it is determined what work should be undertaken, Mr. Goldbeck used as an illustration the problem of using crushed stone as coarse aggregate in concrete. It was 28 years ago, he said, when the handicaps to the use of crushed stone for such use appeared to be serious and a threat to future use. Under methods then in use for proportioning, lack of workability and a handicap in cement factor was the rule, and the association set out through research to develop sound principles for proportioning. The result was N.C.S.A. Bulletin 11 which has just recently been revised and brought up-to-date.

This bulletin has had wide acceptance and has been requested from all over the country for use in universities and short courses, and by practicing engineers and contractors. It has served to produce better concrete and also to help producers in overcoming the former unwarranted prejudice against crushed stone coarse aggregate. Mr. Goldbeck urged that producers see to it that Bulletin 11 get into the hands of engineers and architects where it will benefit them and the producer.



B. R. Maloney, newly elected chairman, Manufacturers Division, N.C.S.A.

Another problem foreseen was the need of a practical way for determining the proper thickness of flexible-type pavement for supporting heavy wheel loads of trucks and airplanes. A great deal of original work involving thousands of pressure measurements was done, which evolved a method of determination. This investigation was another of broad nature which, Mr. Goldbeck said, has resulted in increasing the sales of crushed stone.

He next discussed work in connection with technical difficulties which have come up for attention. One such problem is that of expanding concrete due to alkali-aggregate reaction, which is growing as more so-called reactive aggregates are revealed. Work done thusfar has indicated the problem to be intricate and closely tied to cement composition. The problem has not been solved in detail but ways of overcoming the expansion trouble have been determined. Because the reaction seems to be stimulated by the continuing hydration of certain cement constituents, the use of cements or cement admixtures to minimize the reaction or render hydration products harmless seems desirable, he said, but requires thorough investigation by qualified research cement chemists.

The solution of the expansion trouble may require the use of a pozzolanic admixture or restrict the choice of cements which may handicap a crushed stone producer in his competition with other aggregates not requiring such special treatment.

Mr. Goldbeck touched upon the necessity of becoming very active on the old problem of slippery pavements. It is likely that the fine aggregate has a role in the problem. Admixtures of different and harder fine aggregates is one suggested solution and, in the case of concrete surfaces, the broadcasting of a hard aggregate on the surface just before the finishing operation.

Bituminous concrete has been under intensive study this past year and a promising development in the laboratory has to do with the rapid determination of density of the finished mix. This work is extremely important since the volume of air voids is most important to the behavior of bituminous mixtures in service and must be held within established maximum and minimum percentages. The method for voids determination was described in the September, 1953, issue of the *Crushed Stone Journal*.

The problem of durability of aggregates for use in both portland cement and bituminous concretes has grown in importance. In concrete pavements, air entrainment, which is now widespread, has improved the durability of the mortar so greatly that it is now more durable than the coarse aggregate in some cases. Durability of the coarse aggregate has suffered by comparison with the improved mortar so that there may be a move-



Officers and plant officials of New York Trap Rock Co.

ment to further improve the coarse aggregate. The high costs of modern pavements and the desire to reduce expensive maintenance is another factor.

An important problem in connection with the durability of aggregates, said Mr. Goldbeck, is whether the same soundness specification for use in portland cement concrete should be applied to bituminous concrete aggregate. Freezing tests made this past year on bituminous mixtures with stone from both sound and unsound ledges in a quarry revealed at least as good durability where the unsound stone was used.

The reason for this was explained on the basis of degree of saturation of any stone, which plays a major role in destruction of a stone due to freezing. It is known that when the void space is more than 90 percent filled with water that failure is almost certain and that durability of concrete may be greatly improved by stockpiling the aggregate to allow excess water to drain off and evaporate. It is also known that it takes a long time to re-saturate the stone to a dangerous condition and that this may never happen.

Stone in an asphaltic mix has more favorable pre-treatment by virtue of being dried for removal of moisture and then being water-proofed in the mixing operation. Hence, the stone does not become saturated. The tests have indicated a soundness specification need not be so severe for an asphaltic concrete aggregate as for that used in portland cement concrete.

Mr. Goldbeck said that the increased volume of durability specimens handled and expected has made necessary the enlarging of laboratory freezing equipment by installation of a 5-hp. automatic freezer capable of at least five cycles of freezing per day. The freezing and thawing cycles are performed automatically without removing specimens during the thawing cycles.

Mr. Goldbeck had presented the foregoing as part of a total of 47 projects conducted or started during

1947. Some of the more important other projects were listed. He concluded by mentioning work he is called upon to do in connection with field problems.

### Field Engineer's Report

J. E. Gray, field engineer, presented an annual report built around some of the problems encountered which, while they may occur infrequently, are individually important to producers. Most of his work the past year has largely been on problems involving the quality of crushed stone as measured by standard physical tests.

His paper included a brief description of the more important tests and a discussion of these tests in the light of specification requirements and methods of production.

The Deval abrasion test was first discussed. Nine states require this test which is a measure of the abrasion resistance of a strata of rock as it occurs in the quarry face. The problem involved in the interpretation of this test is difficult said Mr. Gray. Questions came up as to whether one test may be considered as representative of the quarry face, or should separate tests for the various ledges be averaged, or should only those ledges be accepted which comply with the specifications.

A test on one sample may suffice with a massive and uniform deposit whereas, with a variable deposit, the selection of one sample may reject the quarry. The great numbers of ledges in some quarries make difficult the obtaining of average values. Some engineers will not accept an average value but believe the specification limits apply a minimum value for each ledge which can result in operation costs that would be prohibitive. This test has not been correlated with aggregate performance in modern service.

The Los Angeles abrasion test which has replaced the Deval test to a great extent is considered to have much merit as a measure of quality. This test, which was described in detail, is now required in 39 states with



One of the largest delegations to the convention was this large group of officers and plant superintendents from General Crushed Stone Co.

a range in specification limits of 25-65 percent loss. Percentages of wear suitable for use in specifications were listed as 50 percent for concrete, 40 percent for bituminous surfacing and 40 percent for surface treatment. It was pointed out that the specification limits used have little to do with the correlation between the Los Angeles test and service of aggregate, but are based on availability of aggregates of a given quality.

There have been instances where a producer failed by one percent in meeting the test and his stone was rejected, yet a condition survey of concrete structures indicated excellent performance of the aggregate. The trouble is that where states reject stone by such interpretation of the test and serviced aggregate, but are firms may do the same.

Use of sodium sulfate or magnesium sulfate soundness tests was discussed. Such tests constitute acceptance tests by 32 states. The test was described. The range in number of cycles and specification limits for concrete aggregates of the 32 states is 5-10 cycles and 8-20 percent loss which, said Mr. Gray, indicates that the specification requirements are based on availability of aggregates rather than service record. Because these salt tests may cause rejection of some materials with good service records, they are not a completely reliable measure of quality.

A freezing and thawing test has been advocated for aggregate but so far only one state has such a test. Such testing of concrete is common practice but each agency uses its own method and interprets the results by its own judgment, which presents a problem to producers now that air entrainment is in wide use. Since durability of the mortar has been greatly improved by air entrainment, such testing has become to a large extent a test on the performance of the coarse aggregate. Since the test is not standardized there are differences of opinion on test procedure and interpretation.

Mr. Gray next discussed alkali-aggregate reactivity and A.S.T.M. Designation C 33-52T covering a suggest-

ed test with allowable limits for reactive aggregates. Mr. Gray said that this is not a common problem and that thusfar no suspected crushed stone aggregate has been proved to be detrimentally reactive. He said that a potentially reactive aggregate is not necessarily a detrimentally reactive aggregate. He said that performance surveys of structures are the best way to determine if an aggregate might be at fault and he suggested that producers keep records of all sizable projects using their stone, including the date of building and the names of the engineer, contractor and owner.

On the subject of deleterious materials, Mr. Gray discussed soft particles, shale and washing. He believes the scratch test with a  $\frac{1}{8}$ -in. diameter brass drill rod is far better than judging softness by individual opinion. As far as shale is concerned, he said that shale coatings or shale adhering to good stone is the most difficult problem. Researches are under way to develop information for the writing of a specification to set limits correlated with performance in concrete.

He discussed the problems arising with specifications setting limits on flat and elongated particles which differ widely. Producers quoting under such specifications were warned to be certain the requirements would be met or know the additional expense involved to produce such material in order to adjust the quotation.

A trend to the elimination of high faces in favor of bench operations for economical reasons was discussed in possible effects on quality of product. In practice, he said, it rarely results in a uniform blend of stone from top to bottom of the entire working face, and really amounts to two distinct operations. In a massive formation there would be little effect on quality but the effect might be substantial in sedimentary or metamorphic rock. As an example, he said that a stone from a single face might pass the Los Angeles abrasion test and, after benching be adopted, result in rejections due to sporadic blending into the final product. Similarly, adverse results in

soundness tests might result and a two-level operation can cause excessive concentration of a deleterious material in either bench. He suggested that a careful log of the quality of stone in a face be made so that a study can be made of the effect of any proposed benching operation.

The part of crushing as it influences quality was considered. As to particle shape, he said that plant studies can be made to reveal necessary changes to plant practices in the light of need rather than to make expensive crusher replacements. A large part of production ordinarily is for construction uses where angularity is an advantage and, for such uses, excess flat and elongated pieces are objectionable. However, he pointed out that the amount of stone needed to be high in equidimensional pieces is relatively small on a tonnage basis.

In supplying stone for specifications rigid in that respect, he suggested that the amount of flat and elongated pieces be determined as they occur in stockpiles. Then, the amount of such pieces in each size fraction as a product from each crusher might be determined. Then, knowing the source of trouble, studies may be made to effect a remedy such as changing the settings of the crusher to change the reduction ratio, possibly by blending certain sizes of recrushed stone, or maybe installing a different type of secondary crusher. It boils down, he said, to whether the tonnage involved will justify the cost or can the increased cost be passed on to the customer.

In closing, Mr. Gray said that he hoped his review would help producers to anticipate their problems and thus keep them small.

#### Administrative Director's Report

J. R. Boyd, administrative director, in his annual report, summed up the many activities of his office and expressed appreciation to the officers, directors, members and committees of the N.C.S.A. for their continued co-operation and assistance. One of the important actions of the past year was the paying off of the mortgage on the headquarters building in Washington, D. C. which is now owned outright by the N.C.S.A. The building was purchased in 1947. Mr. Boyd pointed to the rental levels in Washington and the increase in the value of the association property to confirm the great wisdom of the association when it was desired to purchase its own building.

The changing picture in Washington was viewed with optimism by Mr. Boyd. He referred to the elimination of non-essential government competition with private industry and the work of the government committee operating under recommendations of the Hoover Commission to improve the efficiency of government. Also, he touched upon the studies being made

of federal-aid highway funds and their distribution for the utmost value in building highways.

According to Mr. Boyd's figures, total construction amounted to \$46.5 billion in 1953 which is the all-time record, climaxing eight consecutive years of increasing activity. Of the total, \$34.7 billion was for new construction, with the balance for maintenance and repairs. New construction had increased by 6 percent in 1953 compared with 1952. He predicted that 1954 will be another high-level year for construction.

Mr. Boyd viewed the outlook for highway construction with particular optimism and cited figures to show the growing recognition that the highway emergency must and will be met. The highest total yet spent for highway building was the \$4.9 billion in 1953. Expenditures are expected to total \$5.5 billion in 1954 and to reach a possible \$7 billion by 1960. Not only is the Eisenhower Administration in favor of more highway building, said Mr. Boyd, but the public has shown a willingness to authorize bond issues for the purpose, and the several states are showing increased signs of activity.

### Merchandising

"Selling to Defend America" was the title of a dramatic speech by Ralph W. Carney, former vice-president in charge of marketing, Coleman Company, Inc., Wichita, Kan. His was a dynamic talk which brought home forcibly the very serious challenge we face in keeping the nation's economy at a level to keep our greatly-expanded production facilities going at rates to sustain employment.

The title of Mr. Carney's speech was selected to drive home the point that the nation's ability to sell what it can produce is of world-wide importance. He tied his theme to the threat of communism, and reminded that Russia sees an opportunity if the United States fails to maintain prosperity and a high level of employment. Already, he said, Russia is claiming that we have 18 million unemployed in this country and is looking for the opportunity to show that it is a "winner" which others would want to follow. He referred to salesmen as "peace-time soldiers of America."

Working into his subject—the need for selling—Mr. Carney said that we as individuals must be concerned that others keep their jobs, and he showed that we must prosper together in a common effort. Should the clerk in a department store not be busy, he said that that is not good for any of us and the combined effort.

Where there is a shortage of 40,000 engineers, he reminded that there is a need for 600,000 salespeople who know how to sell. While selling is not listed in the curricula of our schools, 50 percent of those who come from school will end up in some kind of selling.



Members of the National Crushed Stone Association Accident Prevention Committee

In commenting on predictions of a drop in the national income, he said that such a decrease of 15 percent (already predicted) could well trigger a depression. Uncertainty, apprehension, fear and panic were listed in order as the developments that lead to depression.

Selling, and not legislation, is required to overcome depressed business conditions, emphasized Mr. Carney, and the trouble is that we are ill-prepared to sell.

To emphasize the lack of preparedness to sell, he said that over 80 percent of the people selling in our stores today were in school in 1941, and he cited figures to show that a large percentage of all our adult population, to say nothing of those coming out of school, have had no experience at all in competitive selling. That is the situation as we, all of a sudden, are faced with a buyers' market and enter a period of competition such as we have not experienced before.

Selling has been a forgotten art and the deterioration started in 1939 with the giving of aid to Europe. Ever since, Mr. Carney said that all we have had is conditions under which buyers have had to seek merchandise. People want to buy things that are hard to get and now, he said, they are starting to play coy and wait since goods are in good supply. That is the challenge for salesmanship.

The competition for the consumers' dollar is getting down to a choice of merchandise, as to whether to buy a television set or a radio or something else. The appeal of the modern automobile is in Mr. Carney's opinion, the most dangerous threat to selling because its purchase is reflected in an individual's ability to buy other products for which he might have greater need.

He concluded with a very forceful demonstration of salesmanship, using a small packaged stove with many potential uses as his item to sell.

### Accident Prevention

Progress has been made in the prevention of accidents as borne out by the 1953 record, reported before a meeting of the N.C.S.A. Accident Pre-

vention Committee. In both 1951 and 1952, members had a loss of ten quarry men each. There were four fatalities in 1953.

Reports were received from 92 member plants in 1953 with 85 of them reporting a total of 10,913,895 1/2 man-hours, compared to 72 plants with 9,886,875 3/4 man-hours reporting in 1952. Thirty percent of the reporting members had no accidents in 1953 as compared to only 13 percent in 1952.

A breakdown of accidents by types was shown graphically on a card. Ground was lost in the permanent partial classification, seven of which were caused by moving machinery which shows that more emphasis must be on guarding machinery at danger points. The record for temporary injuries improved and amounted to a saving of over 300 man-days of work.

The figures showed that the number of injuries caused by lifting increased from 28 to 51 in 1953, comprising the largest type of injury. This amounted to an increase from 286 to 951 in days lost. The bulk of these injuries was due to faulty lifting practices. Hernias also tripled.

Hand, eye and toe injuries decreased in 1953 which was credited to the wider use of personal protection consisting of hard hats, goggles and safety shoes. The number of railroad accidents increased from 4 to 17 resulting in a loss of 353 days compared to only 50 in 1952. The committee is seeking suggestions as to methods to cut this type of hazard. In 1953, one man was lost due to falling objects and falling stone which compares with four in 1952. Truck driving caused one fatality in 1953, but the number of accidents from this cause almost doubled. The report was given by chairman C. A. Gustafson.

### Percentage Depletion

Russell Rarey, chairman, Percentage Depletion Committee, in presenting his report reviewed the history of efforts to obtain percentage depletion and experience since the Revenue Act of 1951 when the crushed stone industry became eligible for depletion allowances.



U. S. Bureau of Mines delegation, left to right: Jack Thoenen, J. J. Forbes, and Seth T. Reese

In August of 1953 the Congressional Ways and Means Committee began the revision of the Code, and the association presented a statement of its position on this subject.

This statement comprised three basic propositions: (1) a reaffirmation of the association's previously-declared position that the crushed stone industry is justifiably entitled to a percentage depletion allowance; (2) a reaffirmation of the previously-declared position that the allowance should be 15 percent; and (3) a request for a legislative review of the provisions of the Internal Revenue Code pertaining to percentage depletion to the end that there be removed such inequities as may be found to exist.

The Ways and Means Committee is now working on an entirely new revision of the Internal Revenue Code, said Mr. Rarey, and while it has not been completed, in general, the committee recommends a continuation of the 15 percent allowance for chemical and metallurgical grade limestone, a continuation of a 5 percent allowance for stone for so-called common use, the elimination of all 10 percent categories of stone i.e., dolomite, calcium carbonate, and magnesium carbonate. In lieu of the 10 percent category, these minerals are accorded a 5 percent allowance when used as common stone, otherwise 15 percent.

Mr. Rarey said that the 10 percent allowance continues for asbestos, brucite, coal, lignite, perlite, and wollastonite. No reference in the Code was made to agricultural limestone, said Mr. Rarey, either by name or use, and since no definition of chemical grade limestone is given in the recommendations of the committee it may be held to be considered a chemical grade.

The need for a workable definition of chemical and metallurgical grade limestone is important to both the Treasury Department and the industry, he stated, and it would be unfortunate if it were overlooked or ignored in the revised Code. In conclusion, Mr. Rarey emphasized the need to be alert to preserve percentage depletion for the industry.

### English Granite Quarry

By the use of a color motion picture, Myrton Judkins, managing director, Judkins Limited, Nuneaton, England, showed, "A Modern English Granite Quarry." Mr. Judkins explained that his company had been established over 100 years ago by his grandfather. The picture showed the wagon drilling operations. Blasting is done in a series of ten 25 millisecond delays. Each blast yields approximately 8½ tons per lb. of explosive. A Model 38RB Ruston-Bucyrus electric shovel loads the quarry fleet. The haul to the primary crusher, a distance of

¾ mile, is over a paved road which has been planted along each side with grass, flowering trees, shrubs, and flowers.

Mr. Judkins said the primary crusher, which is an electrically-driven 25 B TelSmith gyratory unit, is charged from both sides, cutting down truck standing time. The minus 6-in. granite from the primary crusher goes to a 20-ton surge hopper over a vibrating feeder and then to a 24-in. conveyor belt, which delivered the material to a scalper where the fines are removed. The plus ½-in. material is directed into two stockpiles. From these stockpiles, the aggregate feeds through a reclaiming tunnel into a 4-ft. Nordberg gyratory cone crusher. From this crusher, materials are conveyed to the screening plant and through a TelSmith scrubber. The entire operation, Mr. Judkins said, is electrically operated.

### Foreign Relations

"America the Constructive World Force," was the title of a talk by Richard Thomas, News Analyst, Foreign Correspondent, member staff of New York Times, New York, N.Y.

Using a series of charts and maps, Mr. Thomas analyzed many of the nation's key foreign relations problems as he found them on his recent extensive trip throughout eastern Europe and the Middle East.

## Safety Awards

THE ANNUAL SAFETY AWARDS of the N.C.S.A. Safety Contest were presented by J. J. Forbes, Director, U. S. Bureau of Mines, Department of the Interior, Washington, D. C., at the general luncheon at which H. E. Rainier presided.

During the 27 years of this competition, Mr. Forbes said, the average frequency and severity rates, 29.58 and 5.25 respectively, have been attained. Although the 1952 rates were not the lowest in the history of the competition, he pointed out that they were well below the average for the 27 years.

In the early days of the contest, it was considered a notable achievement if one quarry or plant went a full year without a lost time accident. Today ten contestants qualified for that outstanding classification.

The National Crushed Stone Association safety award winner in the 1952 contest was Bakerton Mine of The Standard Lime and Stone Co., Bakerton, W. Va., with a record of having worked 177,946 man-hours without a lost-time accident. W. J. B. Houser, superintendent, accepted the award.

The following plants won honorable mention for having operated without a lost-time accident:

Security Quarry, North American Cement Corp., Hagerstown, Md., E. D. Schlotterbeck, plant superintendent

with Mr. Hedley, director of industrial relations, accepting the award.

The New Haven Trap Rock Co. operated two plants which won honorable mention: North Branford No. 7 Quarry, North Branford, Conn., Robert D. Brewer, superintendent, accepted the award, and Wallingford, No. 1 Quarry, Middlefield, Conn., John H. McKernan, superintendent. Charles F. Boss, accepted the award.

The General Crushed Stone Co. operated three plants which won honorable mention: White Haven Quarry, White Haven, Penn., Burr Shaver su-



Horace Krause, Columbia Quarries Co., past president, left, and L. F. Miller, New York Trap Rock Co.

perintendent, who accepted the award; Rock Hill Quarry, Quakertown, Penn., Edgar Z. Cole, superintendent, who accepted the award; and Jordanville, N.Y., Oliver C. Dietschler, superintendent, who accepted the award.

Stephens City Quarry, M. J. Grove Lime Co., Stephens City, Va., Charles E. Bass, superintendent, with F. Grove White, vice-president accepting the award.

Cedar Hollow Quarry, Warner Co., Devault, Penn., Horace L. Woodland, plant manager, who accepted the award.

Prospect Stone Plant No. 6 Quarry, Eastern Rock Products, Inc., Prospect, N.Y., Jesse Haney, superintendent, who accepted the award.

### Better Than You Sound

The luncheon program concluded with a talk, "You Are Better Than You Sound," by Lucile LaChapelle, Chicago, Ill. Mrs. LaChapelle, who gave some humorous examples of speech and the personalities they represented, pointed out that cultivation of a good speaking voice, clearly understandable, was an essential business asset.

### Legislative Developments

John F. Lane, Gall, Lane, and Howe, Washington, D.C., general counsel of the association discussed



Myrton Judkins, speaker from England, and Arthur Goff, Wallace Stone Co., presiding

"Current Legislative Developments" of particular interest to crushed stone producers.

Mr. Lane discussed some of the tax proposals of the Ways and Means Committee as released by Chairman Daniel A. Reed. Rates of percentage depletion in the 15, 10 and 5-percent categories, he said, were reclassified to provide an administratively more feasible and competitively more equitable grouping.

Specifically, the 15-percent grouping includes; metal mines, rock asphalt, vermiculite, slate and chemical metallurgical grade limestone. All these items, he said, are in the 15-percent group except slate which is in the 5-percent group.

The 10-percent group contains; asbestos, brucite, coal, lignite, perlite and wollastonite.



Winners in the N. C. S. A. safety contest with J. J. Forbes, director of the U. S. Bureau of Mines, who presented the awards

In the 5-percent group is included all the items presently listed at 5 percent (except slate, which is now 15 percent).

The Committee, he said, adopted an amendment covering mine tailings that extended percentage depletion to the original owner for the mine tailings at the appropriate rates. Present percentage depletion, he added, is allowed only where the minerals are stockpiled.

In closing, Mr. Lane said the present code does not define a mineral property, and it is not clear, under the regulations and rulings, whether or not several tracts forming a single operating unit can be grouped together for depletion purposes.

### Public Relations Program

Wilson P. Foss, III, president, New York Trap Rock Corp., New York, N.Y., outlined essentials of "A Public Relations Program."

In recent years, Mr. Foss said, there has been a growing need to increase public relations at the community level. To this end, the New York Trap Rock Corp. went about gathering data necessary to make a public presentation that would include: benefits to the community derived from the revenue of the company payroll; a source of good jobs; and aid in national defense.

Newspaper editors were contacted, he said, to learn what they knew about the industry, and from this survey it was found that the papers had only a vague idea of the operation.

A pamphlet entitled, "The Trap Rock Story," was prepared and distributed throughout the community which contains the story and pictures of the entire operation from the history of the rock and the company, and includes the many uses of the products, together with the transportation systems.

The slides shown were photographs and charts taken from the pamphlet, and were presented in the same manner as the company introduced the program before local clubs and civic groups.

### Indiana Test Road

W. T. Spencer, soils engineer, State Highway Department of Indiana, described the "Construction Features of the 1953 Indiana Test Road."

The test road was constructed in South Central Indiana for the purpose of comparing flexible and rigid pavements. The pavements are connected and have identical soil types and conditions, and are subjected to similar traffic conditions.

The Portland Cement Association and the Asphalt Institute, he said, were asked to submit recommendations for the design and construction of their respective projects, with the stipulation, that if their recommendations were approved by the highway department, they would be incorporated in the contract.

The concrete pavement, he stated, is in accordance with the P. C. A. "Concrete Pavement Design." The section consists of a 9-in. uniform concrete pavement on a dense graded granular subbase of either 5 or 6 in., depending on the subgrade soil type.

Flexible pavement design was based on CBR curves developed by the U. S. Army Corps of Engineers, and the soil group index thickness criteria, as developed by the Bureau of Public Roads. The section was 5 in. of bituminous material on 8 in. of water-bound macadam with 6½ in. of open graded, granular subbase—a total thickness of 19½ in.



H. E. Rainer, Federal Crushed Stone Co., and Lucile LaChapelle, convention speaker

## Operating Session

**"NEW DEVELOPMENTS in the Field of Quarry Drilling"** was the subject covered by W. F. Alford, superintendent, Consolidated Quarries Corp., Decatur, Ga. Developments in primary as well as secondary drilling were described, including experience with jet piercing (ROCK PRODUCTS, April, 1953, page 132). Jet piercing uses a high temperature flame, generated by using kerosene and oxygen to pierce rock. This develops a flame in the 3500 to 4000 deg. F. range which has a flame velocity of 6000 f.p.s. The 5-in. burner used 10,000 cu. ft. of oxygen and 40 gal. of coal oil per hour. Also, about 800 g.p.h. of water is required. Under the intense heat, some rocks melt, others spall. Quartzites, sandstones, granite-like rocks and dolomite were classed as spallers but some low silica and coarse-grained granites tended to melt, the speaker said. As the flame is applied to the rock, water circulates to the burner tip to keep it cool. The same water is sprayed onto the hot rock. This is an important drilling factor as it accelerates spalling.

### Drilling Experience

In reply to questions from the floor, the speaker said that some trap rock tended to melt and drilling was relatively slow. Costs, he said were on the high side when compared to churn drilling. The problem is still under intensive study so new developments may indicate improved burner performances. He said the operation was very noisy and that 90 percent (plus) oxygen was used although 80 percent had been tried. The speaker said the holes were rough but they had no trouble loading them with Nitramon or Pelletol, and that holes 1½-in. to 1¾-in. had been drilled in boulders using jet piercing techniques.

Mr. Alford's second piece of primary drilling equipment related to an improved wagon type drill mounted on a modified pneumatic tired tractor. The unit uses an hydraulic system for raising or lowering the feed from a horizontal to a vertical position. Levelling jacks are included. The feed travel is 23½ ft., and is chain driven by an AM-3 piston air motor. The drill is a 5½-in. drifter with cuttings removed by direct air blast. The drill will drill a 4-in. hole at the rate of 6 to 8 in. per min. in granite. Steel is in 10 and 20-ft. lengths and 2-in. dia. Tungsten carbide insert bits are used. A Type D Rotocloner is a part of the dust collecting assembly. The speaker told of the replaceable cylinder liners in use that made it possible to have practically a new cylinder at about one-third the cost. Chuck housings and expensive parts have replaceable bushings, the speaker said.

Air consumption at 80 p.s.i. was at the rate of 600 c.f.m. Holes ranged from 3½ in. to 4½ in. Normal depths

were 50 ft. although holes 75 ft. deep had been drilled.

Mr. Alford described a third primary drill rig that was developed by the Rowe Contracting Co. It featured a 22-ft. steel mast mounted on a load-



E. Burwell Ilyus, consulting engineer, Roanoke, Va., speaker, left, and G. D. Lott, Jr., Palmetto Quarries Co., presiding

er undercarriage, or, the mast can be quickly transferred to a solid tire truck axle for drilling toe holes. From 60 to 100 ft. of 4-in. hole are being drilled per 8 hr., it was said, using 18 to 30-ft. lengths of steel.

In the secondary drilling field, Mr. Alford showed slides of the Travel Drill, (ROCK PRODUCTS, January, 1953). This is a self-contained drilling unit mounted on rubber along with a 230 c.f.m. compressor. The operator of the drill is seated on a chair that is mounted on a 40-ft. boom with controls easily available so that he can control all features of the drilling operation including the operation of the vehicle on which the units are assembled. The speaker said that one operator had eliminated six jackhammer men and was drilling 55 f.p.m. including moving time. A 3-in. drifter with 4-ft. feed screw is used that permits constant forced feed on the drill. Hole collaring at 90 deg. is instantaneous and about 4 sec. for 45 deg. holes. The drill is safe and can reach boulders high in a muck pile. The operator is not exposed to drill dust. In the discussion that followed, Robert S. Campbell, Jr., Campbell Limestone Co., Gaffney, S.C., told briefly of his favorable experience. He said he loaded high holes with a ladder as the drill was too expensive a rig to use as a drill platform.

### Warehousing Problems

H. D. Perry, vice-president, Southwest Stone Co., Dallas, Texas, talked about "Warehousing Problems Dealing with Inventory, Control of Stocks, Etc.," describing the system used by his company. Periodic inventories are taken at scheduled times throughout the year. The system was also design-

ed to help the purchasing department know the reasons behind a purchase, and where the material was used. Mr. Perry showed a series of 11 slides that illustrated the various forms used in their system. He traced use and processing at the plant offices, and at main headquarters.

### Proper Screen Decks

"Selecting the Proper Screen Deck to Meet Specifications" was covered by Montague Hankin, Jr., executive vice-president, North Jersey Quarry Co., Summit, N.J. The speaker said that when the New Jersey Toll Authority was set up, it resulted in heavy buying of screen cloth in the area to meet the newer specifications. Sizing techniques revolved on a "let's try it" basis, and in many cases it was an art and not a science. Mr. Hankin discussed New Jersey and New York specifications and tolerances, and dwelt briefly on sampling techniques. The heart of the talk was built around the result of a survey made in New York and New Jersey at which time exact data was gathered regarding screen types, shape and size of screen opening, types of stone screened, mounting details, direction of rotation of screen (with flow, or against it), and these relationships to the specifications required. The survey was quite comprehensive but did show a wide difference in operating techniques. In reply to a question from the floor as to how to deal with deck blinding, the speaker mentioned the use of heated screens and also that chains on the decks had been tried.

### Chute Design

E. Burwell Ilyus, consulting engineer, Roanoke, Va., had for his subject, "Chute Design." By means of slides the speaker pointed out the types of information needed to properly design a chute. The use of stone boxes to absorb wear when the material travelled in a relatively straight line (as to a conveyor), or for making an angled turn, such as a 90 deg. change in direction of travel of the rock, was described. Chute retarders could also be used if conditions permitted it, and these included placing permanent, wear-resisting strips across a chute so that a bed of material covered the bottom section at all times. This material would take the wear rather than the chute itself. Stone ladders were also briefly discussed. The speaker told of the use of a certain type brick in the turn of a chute which had worked out more satisfactorily than other types of materials. One question related to a method of making a 2-way discharge, and Mr. Ilyus advocated the use of a stone box with vertical slide gates at the sides for the stone to discharge from. Wet fines in the corner of a chute might be helped, the speaker said, by widening the chute at the end. There is no book on chute design, the speaker pointed out.

(Continued on page 171)



Robt. M. Koch, executive secretary, N.A.L.I.



Left to right: John M. Deely, president; Alvin R. Armbrust, treasurer; and John H. Riddle, vice-president

## Exchange Ideas On How to Sell AGRICULTURAL LIMESTONE

**National Agricultural Limestone Institute Convention in Chicago also covers efficiency in production, legislation and recent developments in Washington**

**N**ATIONAL AGRICULTURAL LIMESTONE INSTITUTE's annual convention at the Blackstone Hotel, Chicago, Ill., February 19-20, was attended by the largest number of producers in history. There were more than 400 producers and guests in attendance for the first annual convention not held in Washington, D. C., which reflected the large number of producers in the midwestern agricultural states. There was also more than the usual ratio of ladies in attendance.

Scheduling of the convention was timed over the weekend between those of the sand and gravel and crushed stone industries at the Conrad Hilton Hotel to permit inspection of the exposition held in connection with the conventions of those industries.

Among the sessions of greatest interest were the panel discussions on operating problems and on the promotion of agricultural limestone. The opening meeting was largely a business session at which the reports of the committee chairmen and the executive secretary were heard. President K. K. Kinsey was the presiding officer. John M. Deely, Lee Lime Corp., presided for the second session; Leo L. Davis, Highland Stone Div., New York Coal Sales Co., Chillicothe, Ohio, for the operating session; and Russell W. Hunt, Southwest Lime Co., Neosho, Mo., for the panel on promotion.

### Officers

John M. Deely, president, Lee Lime Corp., Lee, Mass., was elected president of N.A.L.I. to succeed K. K.

Kinsey, Concrete Materials and Construction Co., Cedar Rapids, Iowa. John H. Riddle, Riddle Quarries, Inc., Salina, Kan., is the new vice-president, and Alvin R. Armbrust, Fayette Limestone Co., Inc., was re-elected treasurer.

The executive committee comprises: Arthur R. Alvis, Butler, Mo.; William S. Black, Quincy, Ill.; John M. Deely, Lee, Mass.; Earl L. Heckathorn, Delphi, Ind.; K. K. Kinsey, Cedar Rapids, Iowa; H. C. Krause, St. Louis, Mo.; J. B. Mount, Shouns, Tenn.; C. A. Munz, Utica, N.Y.; Robert M. Patton, Columbus, Ohio; John H. Riddle, Salina, Kan.; and W. E. Stone, Piqua, Ohio.

Regional vice-presidents are Leonard S. Fry, Mercersburg, Penn.; Lar-

ry Fay, Chicago, Ill.; L. R. Falk, St. Ansgar, Iowa; Philip E. Heim, Lowellville, Ohio; and Sam Davis Bell, Nashville, Tenn.

Elected to the board of directors were the following: Illinois, A. E. Markgraf, Pontiac, and Dallas Pickett, Kankakee; Georgia, R. T. Willingham, Atlanta; Indiana, A. F. Duncan, Muncie, Paul Frank, North Vernon, and Arnold Mulzer, Tell City; Iowa, Floyd H. Millen, Farmington, and Wood Weaver, Iowa Falls; Michigan, Robert D. McCrea, Muskegon, and J. E. Ott, Bay Port; Missouri, M. M. Green, Carrollton, Joseph Griesemer, Billings, and A. E. Richardson, Forest City; New Jersey, W. E. Horne, Newton; New York, W. N. Litteer, Watertown; Ohio, Earl P. Holwadel, Cincinnati; Tennessee, Burt F. Taylor, Cowan; Vermont, Charles Rich, Swanton, and T. B. Stafford, Proctor; Virginia, F. Grove White, Stephens City; Wisconsin, E. Ellefson, Viroqua.

### Social Functions

Social functions included a cocktail-buffet supper with dancing and the annual reception and banquet. Mrs. Harry Clark and Mrs. Jules Jenkins were co-chairmen for the ladies program which comprised luncheons, the showing of travel films, sight-seeing tours and other events.

### Promotion

Chairman Russell W. Hunt, opened the panel session on promotion with the statement that the purpose of this meeting was to trade "secrets,"



Sam Omasta, assistant secretary

and to bring out ideas to supplement the over-all promotion activities of the Institute in the industry's effort to offset the reduction in A.C.P. funds. There were four speakers from the industry, each of whom told what his company was doing and a lively discussion followed.

The first speaker, Charles Coburn, Waukesha Lime and Stone Co., Waukesha, Wis., said that his company produces two grades of material each of which requires a different approach to promotion. One is a standard 80 percent minus 8-mesh product and the other is an extremely fine product, 100 percent minus 100 mesh, which is bagged and shipped by rail into northwestern Wisconsin.

Advertising effort is concentrated in local and county areas and on old customers. N.A.L.I. news releases, advertising mats and pamphlets are used throughout the year. Where radio advertising formerly was done only in the Spring and Fall, it is now being tried the year-around in an effort to encourage application of agricultural limestone throughout the year. Radio spot advertising is carried three times a week.

Two of the series of billboard posters developed by the Iowa Agricultural Limestone Association are being used along important roads leading into Waukesha. Permanent-type signboards are also in use, depicting farm scenes and carrying appropriate slogans. Mr. Coburn believes that more personal contacts are required and, to prove the value, mentioned that his son, who is inexperienced, made personal calls and brought in customers.

Lynn Stewart, Meshberger Stone Co., Columbus, Ind., said that his practice is to sell farmers on the idea of a complete soil conservation practice, including the use of fertilizers, drainage, liming, terracing, etc. His company is equipped to render the entire service, and is working to sell the Farm Bureau, the Grange and other agencies on this broad program.

Newspaper advertising has proved more effective than radio. Stress is placed on the county fairs where a miniature farm is displayed and the spreading of agstone shown. The company is equipped to process its own pictures of farmers in color and they are used at the fair. Posters are a means of encouraging off-season liming. Contests are conducted at the fairs and prizes given. The company shows movies at Farm Bureau meetings, furnishes agstone for test plots and makes wide use of N.A.L.I. bulletins. A truck is kept available to deliver fertilizers to the farms when requested. Cards are sent to farmers when ill, and a stamped envelope accompanies all invoices.

William D. Dillon, Dillon Stone Co., Columbus Junction, Iowa, discussed the use of many sales ideas. Billboard advertising is extensively used. Among miscellaneous items are calendars,



John M. Deely of Lee Lime Corp., Lee, Mass., newly elected president of N. A. L. I.

given to 4-H club members, match pads distributed to feed stores, lumber yards and banks, scratch pads with slogans on them and thermometers. Movie trailers are presented at local theaters, advertisements are run in telephone books and advertising is run in newspapers, school annuals and other media. Much use is made of direct mail and colorful envelopes are used. Product of the company is called "cream lime" and that expression is stressed.

Space is taken at the local fairs, where free ice water is made available, pencils are given the children, and chairs are provided for the comfort of farmers. This has proven very popular.

Russell W. Hunt, Southwest Lime Co., Neosho, Mo., told an interesting story of how he stimulated interest in agstone, which involved sending five selected farmers to Lancaster County, Penn., to observe first-hand the great benefits from long-continued (182 years) use of liming and fertilizers. These farmers were impressed and carried the good word back in the form of talks. In the space of two years, the company had built sales up to its required proportion based on the estimated 80 million tons national requirement. As Mr. Hunt expressed it, the farmers wouldn't listen to the producer so the company sent them out to see for themselves.

Two years ago, the company worked out a financing program in cooperation with the banks whereby a complete package, including limestone and fertilizers may be financed. All kinds of fertilizers are kept available for quick service. The method of mixing sacked fertilizers with agstone as taken from stockpiles was briefly described. A charge of \$4 per ton for mixing and spreading is made.

In a discussion about group effort, W. E. Stone told of the cooperative promotion done in Ohio through the Processed Limestone Association which includes two scholarships at Ohio State University. The Iowa asso-

ciation is sponsoring a scholarship at Iowa State University.

A spot check revealed that a number of producers have had business declines due to the cut in the A.C.P. program, but it also revealed that those who are really merchandising have held sales volume up much better than others.

An attractive cup and two medals available through purchase from the association were shown. These may be purchased by producers and given out at year-end in their territories to winners of 4-H Club competitions.

Discussion developed that more attention must be given to improved service and to proper spreading in order that farmers gain optimum results from liming. Also, to be stressed is quality of product and to make certain that truckers deliver honest weights. John M. Deely, president-elect, made the statement that the industry does not pay spreaders of agstone enough. He said that there was too much chiselling of spreaders and that agstone was priced too low to enable a good job of promotion to be done. Prices should be sufficient, he said, to permit spending at least 25 cents per ton for its promotion. The difference between the 28 million tons sold annually and the required 80 millions tons was pointed to as a vast potential which must and can be sold. Mr. Deely's own company has added three new salesmen and an agronomist.

Dixon I. Harper, Farm News Director of the Prairie Farmer Station WLS was the featured speaker at a luncheon at which Earl L. Heckathorn presided.

Mr. Harper stressed the value of promotion and advertising. Promotion was defined as attracting attention and advertising as telling the story after attention has been aroused. Both, he said, are required.

He mentioned miscellaneous items that can be used effectively to reward salesmen such as key cases, ball point pens, but he spent most of his time in a discussion of cooperative efforts such as the sponsoring of test plots and ways to capitalize on farm shows and similar events. He suggested that farmer interviews at farm shows are effective promotion and that organized tours of farm groups to quarries and tie-ins with corn picking contests be considered.

He also suggested that producers get acquainted with their radio farm directors, to exchange ideas and to work together in bringing other groups together for cooperative group promotion efforts. A free soil testing service which would comprise not only pH testing but for complete fertility was pointed out as desirable.

As an approach to the off-season liming problem, his idea is that producers combine their promotional efforts with those of truckers and reward the truckers with prizes for their accomplishment.

Professor C. J. Chapman, who is

Extension Specialist in Soils at the University of Wisconsin, gave a very inspiring talk, "The Importance of Lime in a Long-Time Program of Soil Conservation and Fertility Maintenance," in which he put great stress on the need for the maintenance of soil fertility in order to preserve the nation.

Liming was singled out as the starting place in a program for soil conservation and the very foundation of soil fertility. He said that the raising of the pH to 7 rather than just to 6.5 is desirable and that the job of liming is one that is never done. He emphasized, however, that liming alone is not enough and that it must be accompanied by correct fertilizer application.

Among other things, he said that liming serves to replace  $H_2$  with calcium and make phosphate available to plant growth while ridding the soil of toxic iron and aluminum. Liming, he said, may result in a need for the addition of potassium and will be accompanied by the using up of the phosphates. The use of lime plus potassium and phosphate as a means for preserving security and soil conservation is the nation's defense against national suicide, he stressed in conclusion.

### Percentage Depletion

Percentage depletion came in for considerable attention and, since the convention, several clarifying membership letters have been issued by the association on that subject. The most recent letter, under date of March 4 from the association's tax counsel, Covington and Burling, indicates that the agricultural limestone industry may possibly be entitled to a percentage depletion allowance of 15 percent.

Since the convention, the House Committee on Ways and Means has re-written certain provisions of the Internal Revenue Code, and all minerals other than coal, metal mines, sulphur and certain others have been classified in four groups. In three, specified minerals are granted depletion of 15, 10 or 5 percent. The fourth is a general grouping of all minerals not otherwise provided for. Those in this group will be allowed 15 percent depletion unless used for the same purposes as stone is commonly used. In that event, the allowable depletion is to be 5 percent.

Chemical and metallurgical grade limestone is one mineral in the specific 15 percent group, and the existing provisions of the code list dolomite, magnesite, calcium carbonates and magnesium carbonates in the ten percent category.

According to association counsel, it may be inferred that agricultural limestone will be entitled to 15 percent, either because it is chemical or metallurgical grade limestone or because it is a mineral not listed in the specific categories and is not used for the same purposes as stone.

The Committee has apparently adopted the end use test for all minerals except those listed in the 5, 10 and 15 percent categories. A committee report to be printed may determine whether agricultural limestone is to be included in the specific 15 percent category or in the general 15 percent grouping.

Two test cases involving brick and tile clay are now in the courts to test the regulations as to cut-off point. In these cases, the taxpayers contend that the commercially marketable product is the finished brick or tile and that there is no market for the raw clay before it is molded and burned. A case was filed by a dolomite producer in Virginia claiming 10 percent and the court held that the end use test was applicable, the ruling being 10 percent for chemical grade sold and 5 percent for the balance.

### Operations Panel

A panel on operations was conducted with Leo L. Davis, Highland Stone Division, New York Coal Sales Co., Chillicothe, Ohio, presiding. Members of the panel were M. R. Ackland, Stoneridge Limestone Co., Rochelle, Ill.; C. E. Hageboom, Consumers Co., Chicago, Ill.; and Rolie Schneekloth, High Test Lime Quarry, McCausland, Iowa.

The session was conducted along the general pattern of operational subjects in the order of production, stripping, drilling, blasting, haulage to crusher, crushing, etc.

Stripping was mainly discussed along the lines of contract vs. company work, and if or not strippings should be pushed aside or hauled completely off the property. Contract stripping seemed to be important. Under drilling, several producers outlined their procedures in broad general terms. Wagon drills, it would appear, were having some reactivated competition from churn drills. One member told of a new German high-speed rotary drill that would be in a cost range sufficiently low that small producers could study its performance if and when it is introduced. It was mentioned that a small Joy rotary drill was now doing some demonstrative drilling at a quarry west of

Joliet, Ill. A Pennsylvania operator said he used successfully a Mayhew drill which is a rotary, truck-mounted unit developed in the Texas oil fields. A large operator in Ohio told about eight heavy Joy rotary rigs that cost \$46,000 each and averaged about a foot per minute per drill in limestone. He said bit life was from 3000 to 5000 ft. per bit with one having a 10,000-ft. life.

Haulage involved brief mentions of the use of Euclids and Dumpsters as well as side dump Easton bodies. Distance hauled, size of loading equipment, and tonnage handled appeared to be factors in the selection of haulage equipment.

The subject of crushing received scattered comments that ranged from the use of hammermills for primary crushers to over-head eccentric jaw crushers as well as impact crushers of various types. The choice of a crusher depended on what rock was being crushed, capacities and other operational factors. Impact crushers of the Iowa and Universal types were being used as primary crushers, and single roll crushers had an important place in this picture.

On the subject of screening, two operators told about their favorable experience with heated screens. One used 4- x 10-ft. Hummers at a 32 deg. slope, handling 8 to 10 t.p.h. to recover minus 20 mesh product. Stainless steel Ton-caps were used by this producer. Grinding mills got brief reviews with hammermills, Raymond mills and Stedman mills being mentioned. One producer referred to blending from Raymond mills, using Air-slides, to get the necessary 200 mesh material. One Iowa producer told of having a 4-cage Stedman fed a minus 1/4-in. limestone from which he recovered a 55 to 65 percent minus 100 mesh product and, when minus 8 mesh was fed, he got a still higher percentage of fines. No screen is used in the circuit although he indicated he might run a screen in closed circuit at a later date. The cages in the Stedman run in opposite directions and one inside the other. They both run at 1000 r.p.m. but at different peripheral speeds; 20 and 30-hp. motors were used and production was 8 to 10 t.p.h.

A Virginia producer was interested in how to keep down dust and an Ohio operator told about the J-M compound, a setting agent that required little water and was an effective dust control system. The cost installed was said to be \$2800. He used 2 gal. per day of the wetting agent at the ratio of one gallon per 700 gal. of water. The chemical cost \$3 per gal. in lots of 12 or more drums.

Pug mills or mills of a similar type were briefly mentioned as a means of dampening a finished product before loading for shipment. One said that calcium chloride was effective in keeping down dust. Stockpiling was discussed, and one New York pro-

(Continued on page 178)



Russel W. Hunt, Southwest Lime Co., one of the speakers



Airplane view of Dragon Cement Co. plant and quarry. Note neat appearance of grounds and tree-lined concrete highway leading to plant

## Dragon Doubles Plant Capacity

Installation of new kiln, clinker cooler, and additional finish grinding mill has almost doubled capacity of Dragon Cement Co. plant at Thomaston, Maine

HUBERT C. PERSONS\*

THE TWENTY-FIFTH ANNIVERSARY of the opening of the Dragon Cement Co.'s plant at Thomaston, Maine, was observed in 1953 with a minimum of "harking back" and a maximum of looking ahead. The silver anniversary has been marked by the installation of a new 353-ft. long rotary kiln, a new clinker cooler and an additional finish grinding mill. These installations have nearly doubled the plant's productive capacity. But in addition to equipment, experience of the last quarter century is being applied to various manufacturing operations and especially to protect the health, and improve the safety and general welfare of the men who operate the mill. The Dragon plant is wet process and the only cement mill in the New England states.

Of the original force of men on the job when the Lawrence Portland Cement Co. opened the Thomaston plant in 1928, 15 are still on the payroll. The company name was changed to Dragon Cement Co., Inc., in December, 1952.

Installation of the new kiln brings the rated annual production capacity

of the plant to 2,000,000 bbl. Previous maximum output was 1,200,000 bbl. The finish grinding capacity is about 2000 bbl. per day greater than burning capacity.

Lining of the new kiln is designed from experience with previous kilns. There is 40 ft. of basic Magnecon brick; 15 ft. of 70 percent alumina; 16 ft. of 60 percent alumina; 20 ft. of 50 percent alumina superduty; and 70 ft. of wear-resistant brick in the chain section. The remainder of the kiln is lined with insulating firebrick.

### Instruments on New Kiln

Although the new F. L. Smidth kiln is the same length and diameter as the Allis-Chalmers kiln which has been in service since 1945, there are a number of differences in operation

and instrumentation. Both kilns are 11- x 356-ft., and are rotated at a speed of 1 r.p.m. Instruments on the large F. L. Smidth control board of the new kiln provide the burner with the following information:

- Primary air temperature
- Primary air pressure
- Fuel oil temperature
- Fuel oil pressure
- Hood pressure
- Cooler pit temperature
- Burning zone temperature
- Kiln draft
- Exit gas temperature
- Kiln draft
- Percent O<sub>2</sub> in exit gas
- Dust chamber temperature
- Temperature before and after the Buell dust collectors
- Kiln speed
- Kiln feeder speed
- Kiln revolution counter
- Manual check on exit gas temperature
- Manual check on cooler pit temperature

### Kiln Honors Vice-President

Burner men have long called the older kiln "Little Joe." The new kiln is named "Big Ben," although actually it has been dedicated to William



A plaque for the newest kiln which is named in honor of Vice-president William H. Klein

\*Industrial Public Relations Consultant, Chicago, and for many years with Public Relations Bureau, Portland Cement Association.

H. Klein, Dragon Cement Co.'s vice president in charge of production. A plaque reciting that fact is mounted at the left of the hood.

In February, 1950, the kiln firing was converted from coal to oil. A standby coal mill is maintained, however, so that the plant could go back to coal if necessary, with little loss of production time.

The kilns consume about 43,000 gal. per day of bunker C No. 6 oil. Fuel storage tanks have capacity for 315,000 gal. The fuel oil is preheated to 225 deg. F. and goes to the burners under 300-lb. pressure. Preheating is done with a Superior 85-hp. steam generator. Two such generators are maintained, one being a standby.

Maximum kiln temperature is 2900 deg. F. Clinker is discharged into a Fuller inclined-grate cooler at a temperature of between 2500 and 2600 deg.

### Blending Procedure

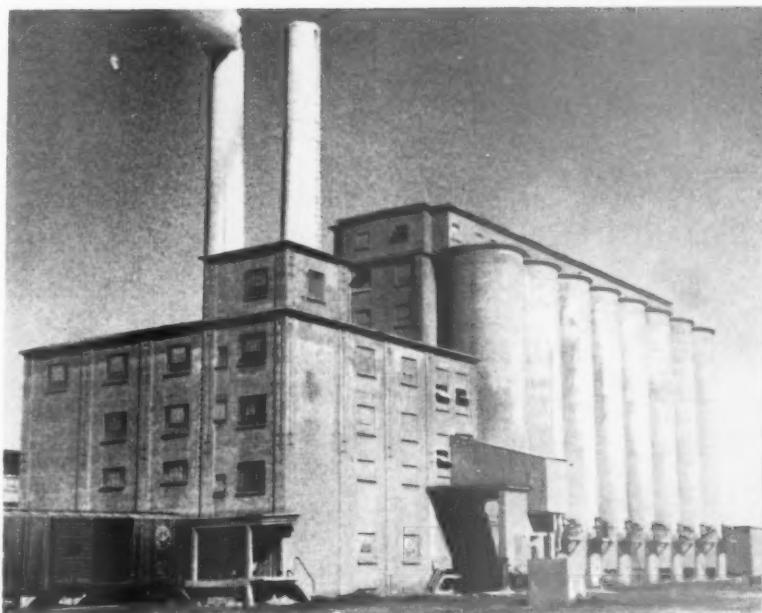
Blending of the raw material, especially important in this company's operations, starts in the quarry. Composition of the limestone in the quarry is variable and at least two faces must be worked at the same time. The so-called "high" rock contains 43 percent or more of calcium oxide. It is called "low" rock when it contains any percentage less than 43 percent of calcium oxide.

Laboratory men are making constant analyses of rock while it is still in the quarry. Cars to the primary crusher are loaded with "high" or "low" rock according to instructions from the laboratory. In the raw storage building the high and low rock are kept separate.

The raw storage building has space for 25,000 tons of stone which has passed through primary and secondary crushers. Three thousand tons of gypsum and 250,000 bbl. of clinker can also be stored in the same building. Two Harnischfeger traveling cranes with  $2\frac{1}{2}$  cu. yd. buckets, convey the stored raw material to the hopper feeding the mills. The proportion of high or low rock fed into the mills varies according to orders from the laboratory mix control operator.

### Raw Grinding

Raw grinding is done in two 40 ft. Allis-Chalmers three-compartment Compeb mills driven by 800-hp. motors. These Compeb mills contain 145,000 lb. of forged steel balls ranging in size from 1-in. to 3-in., the larger sizes being in the feed end of the mill and decreasing to 1-in. in the third compartment at the discharge end. In these mills, water is added to facilitate grinding and form a slurry with a water content of about 31 percent and a fineness of 90 percent plus passing a 200-mesh screen. Water content and fineness are carefully controlled according to laboratory orders. Either of the raw grinding mills can handle 43 t.p.h.



Cement storage bins have a total capacity of 152,000 bbl.

The slurry is discharged from the mills into a sump from which it is pumped into a milling tank for more complete blending. Slurry from the milling tank is sampled hourly and tested for lime content. When the milling tank is filled, the slurry is then pumped into one of a battery of 12 correction tanks. The slurry in the correction tanks is being sampled constantly and by pumping from one correction tank to another, the slurry can be blended to within one-tenth of one percent of the required calcium carbonate.

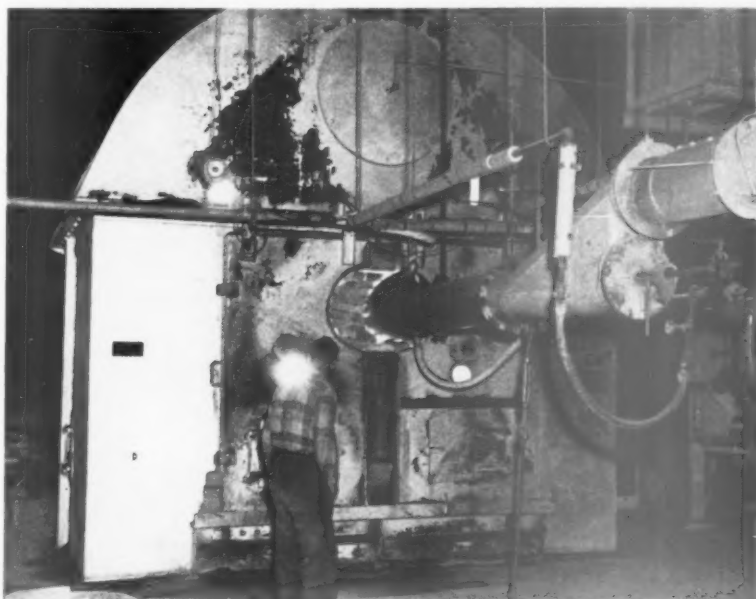
When the blending is completed the corrected slurry is pumped into a kiln basin which holds the equivalent

of six correction tanks or enough slurry to feed the kilns for 12 hr. Slurry intended for the Allis-Chalmers kiln first passes through a slurry filter which removes 50 percent of the water. Slurry for the new F. L. Smidth kiln goes directly into the kiln as it is.

### Finish Grinding

The cement clinker, after cooling, is ground in a pair of four-compartment Allis-Chalmers mills similar to the raw grinding mills. Recently a third clinker-grinding mill has been added. This is a 10- x 18-ft. F. L. Smidth ball mill.

The original quarry opened in 1928



Firing end of new kiln. No. 6 Bunker C fuel oil is used



Overall view of quarry showing drilling, haulage and shovel equipment

is still being worked although a new one is to be opened shortly. Rock is being taken from benches at 40 ft., 70 ft. and 100 ft. levels. Five Koehring Dumptor trucks of 7-cu. yd. capacity are used to haul the rock from the quarry to the hoist cars at the foot of the incline leading to the primary crusher. Two Marion electric shovels and one Bucyrus-Erie diesel powered shovel are used in the quarry.

### Blasting Technique

Since 1947, Harold B. Kaler, assistant superintendent and Bill Valenta, quarry foreman, under the direction of John M. Pomeroy, vice president and plant manager, have been developing blasting technique for

millisecond delay detonations. Blasting is done on an average of twice a month. Up to 40,000 tons of rock are shot down at each blast. About 3.6 tons of rock are produced for each pound of explosive used. Two jack hammer operators handle all secondary drilling. Air for the jack hammers is furnished by two Worthington 500 c.f.m. air compressors.

Recent blasting has been with ammonium nitrate explosive instead of gelatin. A DuPont timer is being used to secure an average delay of about 20 milliseconds (.020 sec.) between firing of holes. This has increased rock output, reduced blasting costs and given better fragmentation, quarry men say. The new detonation meth-

od is also said to reduce both ground and air vibrations and leave the quarry face in better condition with less backbreak.

### Guard Against Lightning

Special precautions are taken to guard against premature quarry explosions from lightning. A Hallicraft radio receiver, installed in the hoist operator's cab, is kept tuned to a Portland, Me., station. Approaching thunder storms create static noises in the radio receiver. If blast holes are being loaded when this occurs, Quarry Foreman Bill Valenta and everyone of his 33 men are ordered out of the quarry the instant a warning is received.

At present a tunnel, 33 ft. in diameter, is being drilled to a point 300 ft. north of the quarry. This tunnel will pass under U. S. Highway No. 1 from the present quarry at a depth of approximately 95 ft. About 70 ft. of the overburden is rock and 25 ft. is clay. The tunnel will facilitate the opening in 1954, of a new quarry on a 70-acre tract. The tunnel work is being done by the regular quarry crew. The present quarry, now 140 ft. deep, will go about 20 ft. deeper before it is abandoned.

### Plant Water Supply

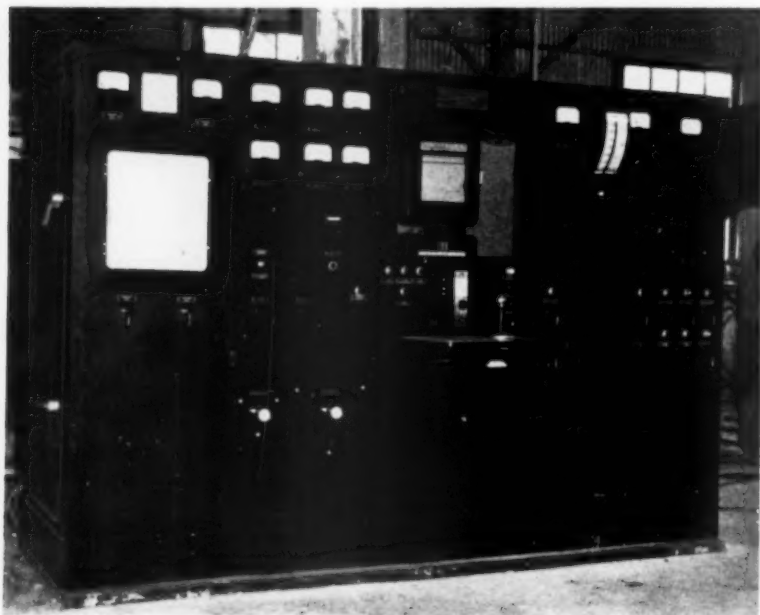
Water for slurry, for cooling and all other manufacturing requirements, comes from a sump pond at one corner of the quarry. An Ingersoll-Rand 1000-g.p.m. pump and a 750-g.p.m. pump, both installed on a floating pump house, keep the quarry dry in all weather. The water is pumped to a 375,000 gal. reservoir from which the plant water supply is taken. A considerable portion of the water used for cooling is returned to the reservoir through a spray cooling system.

### Handling Primary Rock

The primary crusher is a 42-in. McCully gyratory located at the top of a 30-deg. incline leading from the quarry. Quarry trucks dump two at a time, facing each other, into an Easton dump car holding 15 tons. Two tracks forming a Y near the dumping point, run up to the crusher. Two cars are operated on the same cable drum, one ascending as the other descends. The switch at the Y is automatically tripped by the wheel flanges of the descending car and the spring of the switch puts the rail points in proper position. This switching device was designed by Assistant Superintendent Kayler. Up and down movement of the cars and dumping at the primary crusher are controlled by the hoist operator stationed in a cab at the top of the incline. The cars are dumped with a 15-ton P & H hoist.

The secondary crusher is a Williams Jumbo hammermill which has a capacity of 220 t.p.h. of rock.

The release of dust from the crushing plant, mill rooms and clinker handling conveyors is effectively prevent-



Instrument control panel for new kiln

ed by banks of Norblo dust collectors. The gases from each kiln pass through a large capacity Buell cyclone type collector before they are released to the atmosphere. These collectors are so efficient that no noticeable dust is deposited in the surrounding community. Screw conveyors carry the trapped kiln dust to a surge bin from which it is returned to the kiln feed.

A quonset-type building, 60- x 20-ft., at the first level of the quarry is utilized for storage and maintenance of trucks and other equipment used in the quarry. Adjoining this is another building housing a Youngstown oil refiner. Truck crankcase oil is changed every 100 hr. About 100 gal of oil per month is reclaimed with this equipment.

Although electric current for the mill is supplied by the Central Maine Power Co. a 350-hp. auxiliary Fairbanks-Morse diesel generator is maintained as a safeguard against temporary power failure. Two Sullivan 1800-c.f.m. air compressors and two vacuum pumps are also maintained in the company's own power house.

### Cement Storage

There are 19 circular cement storage silos and two star-shaped bins with a total capacity of 152,000 bbl. Finished cement is conveyed to the silos by two Fuller-Kinyon pumps of 6 in. and 7 in. diameter, behind the dry mills with an 8-in. stand by. Gravity bulk loaders are on 14 of the outside silos. About 50 percent of the output is shipped in bulk cars. Seven cars can be loaded at one time.

Five types of portland cement and a mortar cement are made: Types I, IA, II, IIA and III.

The mill laboratory, presided over by R. A. Hoch, chief chemist, has a staff of 15 including four sample boys; four mix control men; three analysts; two physical testing men; a general laboratory man and the chief chemist. Equipment includes a Perkins-Elmer photometer for alkali determinations.

### Win Safety Trophy Six Times

The highly prized Portland Cement Association Safety Trophy has been won by the men of the Dragon plant six times. It is awarded to the cement mill which has operated a full calendar year without a lost time injury to an employee. The trophy was first won in 1931 and again in 1939, 1947 and for the three years from 1950 through 1952. In the latter years the plant operated 1387 consecutive days without a single disabling accident.

The fine safety record is credited to the work of the plant safety committee under the guidance of Vice President Pomeroy and Burton L. Ervin, director of safety. The safety committee is composed of 12 men, not foremen, assuring representation from each department. They are elected annually by a majority vote of all mill employees. Members of the committee constitute the plant's safety police.



Quarry trucks discharge to dump cars for haulage to the primary crusher. A 15-ton hoist pulls cars up inclined track, using a single cable drum

A chief and a captain are elected from members of the committee.

As would be expected in a plant which is acutely safety conscious, grounds and buildings of the Dragon mill are impressively neat from quarry to packhouse. Entrance to the plant from U.S. highway 1 is by way of a long concrete-paved lane bordered by spruce and fir trees. Except for two tall stacks with plumes of thin white vapor, the view from the road gives no evidence of the existence of a cement mill.

Vice President Pomeroy is among the 15 men who have been plant employees since the beginning, 25 years ago. Others are: Bill Valenta, quarry foreman; Ray A. Hoch, chief chemist; Alfred Starr, packhouse foreman; Edward Lynch, plant auditor; Alfred Sanders, labor foreman and

Henry A. Day, Herbert Lord, Harry Gillis, Wilson Langan, Maurice Haskell, Veto Leo, Millard Brackett, Bert Merrill and Blin Hunt.

Key men in plant operations, not previously named, include Charles F. Huntley, plant traffic manager; Jas. A. A. Jeffery, master mechanic; J. Malcolm Humphrey, chief electrician; Eugene H. Stockford, mortar plant foreman and Leroy E. Seekins, head shift foreman. The plant now employs an average of 250 men.

Officers of the company are: James H. Ackerman, president; R. H. B. Smith, vice-president in charge of sales; W. H. Klein, vice-president; J. M. Pomeroy, vice-president; R. J. Unger, assistant to president; A. H. Schaeffer, secretary; and J. K. Criley, treasurer. Headquarters of the company are at 150 Broadway, New York.



Raw material storage building has a capacity for 25,000 tons of crushed stone



Above, to the left, is tumbler washer over screen with sand screw below. In the background is a screen, operated dry, over final crushers. Pond below is for tailings

**Frontier Stone Products, Inc., Lockport, N.Y., has separate fine grinding plant for the production and sacking of finely ground products**

By **WALTER B. LENHART**

## FINE GRINDING For Agstone and Asphalt Filler

**A**GRICULTURAL LIMESTONE is an important part of production at the Lockport, N.Y., operations of Frontier Stone Products, Inc. Special facilities have been provided to produce and deliver it to the farmers as they like it; that is, with a minimum of dust losses at the time of spreading. Essentially, this is accomplished by mixing the agstone in a Kent continuous mixer along with enough water to give a 2.5 to 3 percent moisture content. The mixer is mounted over the driveway used by

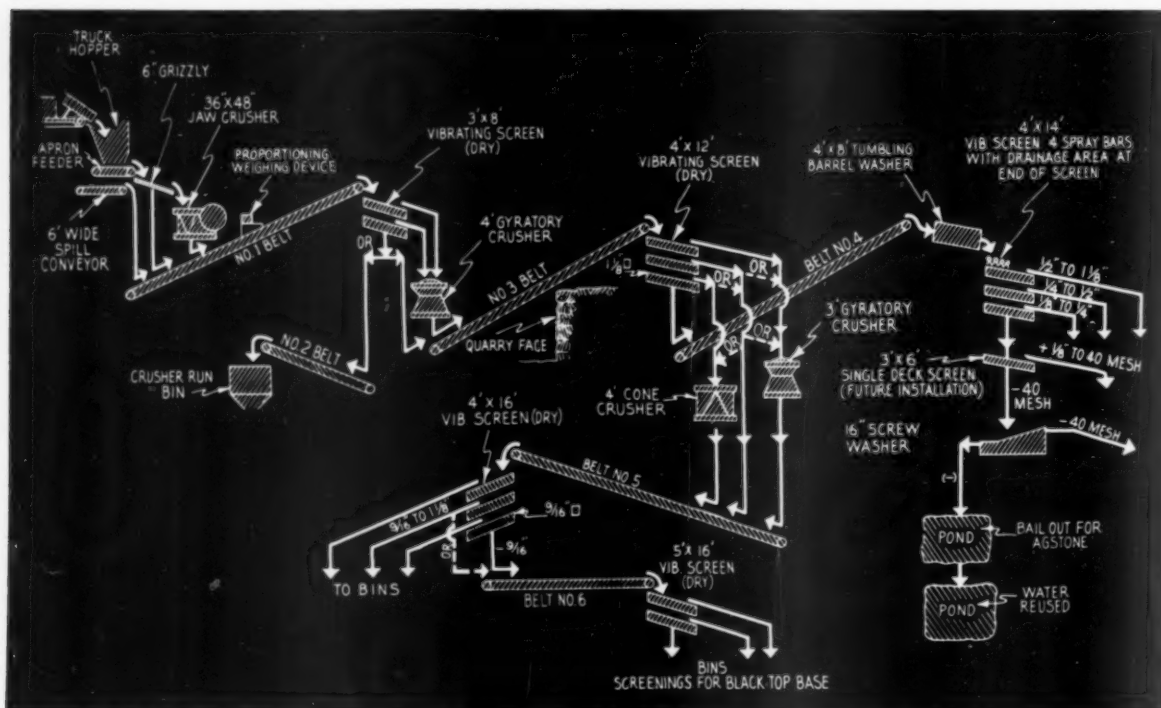
the spreader trucks at the time they are loaded. The company has four spreader trucks; Highway and New Leader units mounted on International chassis.

The flow diagram gives the essentials of the plant operations for the production of agricultural limestone and asphalt filler. Materials from crushed stone operations ahead of the agstone plant are dried in equipment that is a part of the bituminous asphalt plant and trucked 50 to 100 yd. to a truck hopper at the agstone

plant. A bucket elevator delivers to a Derrick vari-speed two-deck vibrating screen. This screen has no throw, the vibration being obtained through an unbalanced pulley with the screen mounted on rubber cushions. The top deck is  $\frac{1}{4}$ -in. wire mesh with the bottom deck 20 mesh.

### Fine Grinding Operation

Throughs from the bottom deck go to a bucket elevator and to a bin ahead of the Kent continuous mixer. The plus fraction from the top deck



Flowsheet of crushing, screening, washing and bin facilities



Left: Fine grinding plant. To the left may be seen continuous mixer above truck loading aisle where small quantity of water is introduced to wet agstone. Dust collectors shown to the right. Right: One of the fine grinding mills to prepare agstone

goes to a Bradley Jr. mill that discharges to the bucket elevator above mentioned. The Bradley mill produces about 8 t.p.h. The minus  $\frac{1}{4}$  in. plus 20 mesh from the Derrick screen goes to a 4- x 8-ft. Kennedy-Van Saun ball mill which discharges to a K.V.S. air pump. The ball mill discharge can be pumped to the agstone bin, or to a separate bin and be shipped, or used, as asphalt filler.

Sacked material in paper bags is packed in a 2-tube St. Regis packer mounted on rails so that it can be shifted between the agstone bin and the asphalt filler bin with the filled sacks falling to a slat conveyor for delivery to trucks. Dust from the plant is collected in a battery of Sly dust collectors with the collected material sent to the asphalt filler bin. The two pulverizing units have a capacity of 15 t.p.h.

### Crushing and Screening

The rock processed at this plant is a dolomitic limestone. The primary crusher, scalper screen, secondary crusher and the bin for crusher-run material are all located on the quarry floor. The capacity of the plant is 400 t.p.h. for all sizes with the minus  $1\frac{1}{2}$  in. being washed. There are four crushers; a 36- x 48-in. Traylor jaw as the primary, a 4-ft. Ty Traylor as the secondary, and a 4-ft. Symons and a 3-ft. Ty Traylor as final reduction crushers. A fifth crusher to be installed will be a 3-ft. Symons cone.

Loading in the pit is with two  $1\frac{1}{2}$ -cu. yd. Osgood diesel shovels, one of which is powered with a General Motors diesel and the other has a Buda engine. Mack and Euclid trucks are used. Two Ingersoll-Rand wagon drills do the primary drilling. The quarry is operated from two benches. Hercules and DuPont explosives are detonated with Hercules milli-second delays.

Trucks deliver to an apron feeder ahead of the Traylor primary jaw crusher with a grizzly between the

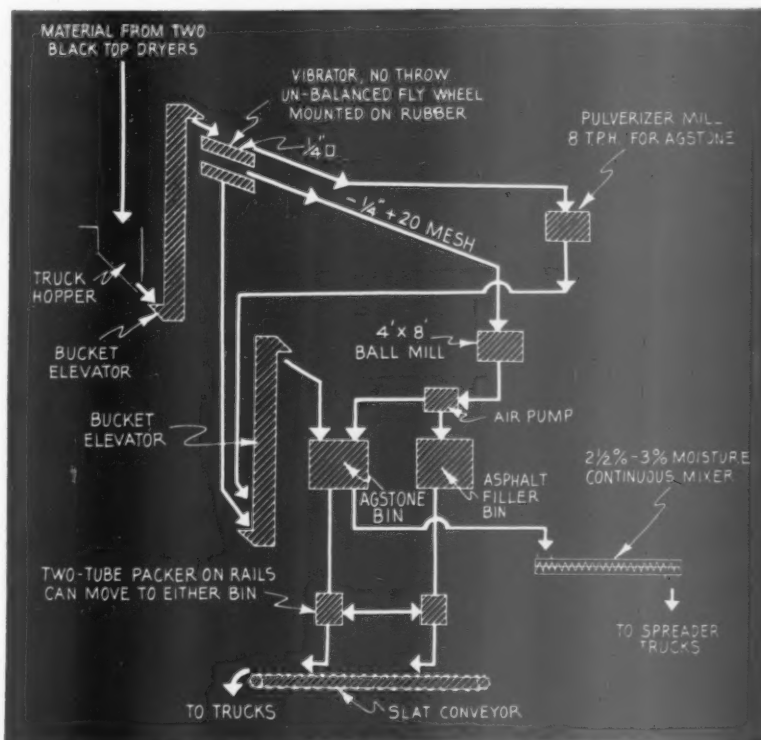
apron feeder and the crusher. The throughs from the grizzly fall direct to No. 1 belt. Under the apron feeder is a flat running, 6-ft. wide belt conveyor driven from the power take-off of the apron feeder. All spill from the feeder falls to this belt which delivers back to the No. 1 belt. This keeps the pit under the assembly clear of debris. Conveyor belt No. 1 from the crusher is provided with a Merrick Weightometer so that plant production can be accurately gauged.

The scalper screen is a 3- x 8-ft. Seco two-deck screen, operated dry, with the products from both decks

going to the 4-ft. Ty Traylor. Material from the lower deck can be diverted to a belt conveyor and sent to a truck loading bin as crusher-run. This is used when top rock is being processed which might contain small amounts of overburden, or this minus 2-in. material can go to belt No. 3 that carries the crushed stone out of the quarry to a 4- x 12-ft. Seco three-deck screen mounted over surge bins.

The minus  $1\frac{1}{2}$  in. from the lower deck of this screen is moved by belt conveyor to the wet plant. This ma-

(Continued on page 170)



Fine grinding operations at agstone and asphalt filler plant



Michigan State College Soil Science Department determines need for liming material by conducting field experiments

**Liming's role in increasing the efficiency and production from each farm acre, and its part in nutrition starting to be stressed more by producers**

By BROR NORDBERG

## PRODUCERS' IDEAS About Merchandising

**T**HE NEED FOR GREATER EMPHASIS ON merchandising has been driven home to producers of agricultural limestone as a result of developments this past year and because of uncertainties that lie ahead.

Reduction in government funds as approved for the soil conservation program for fiscal year 1954, combined with the severe drought throughout the midwest in 1953 and reduced farm income, reduced the tonnage spread in 1953 below the figures for the preceding years.

Appropriations by the government for fiscal 1955 have yet to be made, and there will continue to be uncertainty in that regard for the years ahead. The level of farm income is definitely lower than it has been for the last few years, by some 15 percent, which is really a far more serious challenge to the cause of agricultural limestone than reductions in federal funds.

As this is written, conjecture has it that the appropriation for fiscal 1955 may be increased over the \$195 million soil conservation figure for 1954 and that administration of the program, even though the dollar figure may not be greatly enlarged, may prove more favorable to liming than it has in the past.

Thinking in official Washington is leaning in favor of practices to divert more and more land from crop production to soil-conserving crops, which is sound long-range planning in view of future demands for crops to be made by our rapidly increasing population. Agricultural limestone will play a large role in any such program since its use is vital to the growing of grass crops, and because its requirement is greater per acre than for crops raised for direct human consumption.

Regardless of the extent and scope of future federal soil conservation programs it certainly has been driven

home to many producers, by events of the past several years, that it is risky indeed to count too heavily on government payments for liming as a business practice. Many of the smaller producers, in particular, have depended too long upon government funds, and on the efforts of federal workers and state agronomists to move their product.

It was a mistake, from the beginning of the government program, not to put forth more real effort to sell their product on its merits so as to build acceptance for agstone to endure, whatever the future direction of government programs.

It seems to us that federal funds eligible to be spent for liming, assuming that they will continue to be appropriated, will continue to be subjected to challenge as to amount and that this financial prop will fall far short of supporting a sound agricultural limestone program. The federal programs unquestionably have played a major role in getting farmers started on the idea of liming, and in starting many small producers in the business of producing agricultural limestone. Continuation of such programs will contribute importantly to enlarging the tonnage used, for the benefit of the farmer and the public, and may therefore be desirable, but not nearly to the degree that could be accomplished if supported by really effective sales promotion and educational work among farmers by producers themselves. Only through such efforts to expand the use of agstone, and through proper liming practices that will prove out in results, will the kind of acceptance be built that will endure and cause the farmer to continue to want to buy limestone.

Until the farmer is made to realize that agricultural limestone is not just a cheap "corrective" available at a 50 percent discount, there can be no real progress toward the ultimate goal

of 80 million tons required annually. As long as producers just peddle limestone in support of that thinking, and follow the practice of cutting prices just to move tonnage and thus further cheapen their product, there will be less and less opportunity and funds to do the selling job required.

Those in this category should gain much inspiration from the experience of others this past year. The merchandisers in the industry suffered much less loss in sales volume this past year than the order-takers, at a time when the total annual tonnage dropped sharply.

Reports on business conditions at the recent annual convention of the National Agricultural Limestone Institute brought this out sharply. The Institute itself has been greatly expanding its efforts to provide a constantly increasing flow of low-cost sales tools that are being used with great success by the more progressive producers. Many of them go farther and have supplemented these services by the hiring of outside salesmen and agronomists and by the use of all manner of advertising and sales promotion ideas.

Need figures for agricultural limestone disclose an enormous potential to shoot for, yet overall progress continues slow in inducing more farmers to use more agricultural limestone. Its many merits have been proved beyond doubt and there is a wealth of accumulated scientific data available to prove that the cost of agricultural limestone to the farmer is paid for many times over in increased yields and profits.

ROCK PRODUCTS has stressed the great need for sales promotion and merchandising in the April Agricultural Limestone Issue for the past several years and, in this issue, attempt to bring out new approaches that might be used to induce farmers to buy more agstone. We have asked

producers and leading agronomists to give us the benefit of their ideas for summary herein. Our letter read, in part, as follows:

"Much of the emphasis in recent years has been on selling to the farmers the idea of increased yields of crops as a result of liming the soil. That is a strong selling point but we believe that other arguments must be emphasized also to sell the farmer and the public, because farmers are experiencing lower income and some crop surpluses that might not make increased production alone always seem so attractive to them.

"Liming is important for other reasons than increased yields and among them are protection of land from erosion, improved nutritional values of crops, the development of pasture lands and possibly higher prices to be paid for superior crops. Are you using any of these arguments or do you think they have merit? We would like a letter from you, commenting on merchandising in general and some of these approaches to the selling job. Obviously, it is difficult to promote the idea of nutritional values to the farmer alone since that is something of concern to the general public. What do you think should be done to impress the value of liming on the general public?

"What is your outlook for sales and what are the principal obstacles to sustaining and increasing volume of sales? Is the new mandatory soil testing provision proving to be a handicap?"

Response to our letters was informative and we thank all those who contributed to our discussion. We summarize the letters herein, quote from some of the more informative and follow with signed articles from some of the agronomists.

### Producers' Views

Several producers, and agronomists too, believe that the contribution of liming to farming efficiency could be stressed to advantage now that farmer income has declined. This would comprise pointing out how liming would increase the crop yield per acre, reduce fertilizer cost, permit more effective use of mechanized equipment, reduce overhead per unit of crop production and contribute to ease in farming.

It was pointed out by several that there are not enough good salesmen in the business and by others that anticipated results did not justify putting salesmen into the field. One producer has shifted emphasis from the money return angle, which proved unsuccessful in increasing sales, to the health approach and appeals to the farmer that his land must be maintained to provide for future farmers.

Several expressed the opinion that the value of liming and an overall sound soil conservation program must be impressed upon the public from

Two types of advertisements which have an appeal not only to the farmer but to the health of the general public

the standpoint of nutritional values so that the consumer will become concerned about health and for the future of farming. This would, of course, require efforts running into considerable expenditures for advertising and likely require organized group effort. Some producers have added salesmen and agronomists in the belief that personal contact is the best way to sell the farmer. The mandatory soil test requirement, while under criticism in some respects, is generally looked upon with favor as providing an opportunity for close personal contact with the farmer and chances to render many services in building sales. It will impress upon the farmer, positively, his needs for liming and fertilizers and, in the opinion of producers, will thus prove very effective in taking the guesswork out of soil treatment. Also, it will result in optimum use of liming materials which will result in best performance and thus prove the value of liming.

One of the best ways to influence the skeptical farmer is to show evidence of definite results from liming whether that be done by demonstration plots, data from agronomists or by showing actual results from other farms. Advertising of all types is being greatly increased and many producers are now advertising the year-around in efforts to spread sales throughout the year.

Some of the most interesting remarks on how to approach the problem of increasing sales are as follows:

Penn.: "Our comments are in accord with your letter as we feel that these reasons listed by you have a great deal of merit, since we have investigated thoroughly the value of liming and believe that the user will receive all these benefits. We have used literature prepared by the National Agricultural Limestone Insti-

tute, as a selling medium, which emphasizes these arguments both separately and collectively. Being members of the Institute, we follow closely the promotional programs set up by this organization.


"Our outlook for the year 1954 is as good as 1953, the principal obstacle being in educating the general public in the need for a strong conservation program. We also feel that the mandatory soil tests, though they slow up the receiving of orders, will benefit the industry in the long run. This test will be positive proof to the farmer that his soil is in need of liming and will prevent overliming which has been done in some cases."

Iowa: "I happen to be a small dealer located on the 'fringe' area in regard to the use of limestone. Except for a few rare cases no agstone was used in this territory until the last 10 or 15 years. Many farmers still do not understand its use, (this is also true of fertilizers) and it is pretty much of a job of educating the farmers in regard to these matters.

"I am certain that practically every farmer that uses limestone does so because he expects to make a profit by so doing. If he cannot see an increased yield in his crops, he feels that the lime was of no benefit. Since limestone is slow in acting, it is hard to sell a tenant on its purchase.

"I have been trying to get out promotional literature every year, a short time ahead of the farm program sign-up. We have had soil-testing requirements for the past few years, and in many cases the slow reports from the samples sent in create a hindrance. However, as a whole, I think the testing is a very good thing, and I have always suggested to my prospects that they get their soil tested first before giving me an order. After all, if they use liming on land where

### LIME YOUR FARM TO . . .



1. CORRECT SOIL ACIDITY
2. FURNISH AVAILABLE CALCIUM FOR PLANTS AND ANIMALS
3. INCREASE THE EFFICIENCY OF MANURES AND FERTILIZERS
4. IMPROVE THE CROPPING OF MINERAL AND ORGANIC

As a result of the testing of the following soils, the following results were obtained:

Soil	Yield (bushels per acre)	Yield (bushels per acre)	Yield (bushels per acre)
Normal	100	100	100
Acid	100	100	100
Alkaline	100	100	100



CALL OR SEE US ABOUT YOUR LIMESTONE NEEDS

**O'BRIEN ROCK CRUSHER**

Telephone No. 2668

St. Paul, Kansas

### PROSPER WITH PASTURES BY APPLYING LIME

MINUTE MAKING PASTURE

THE HIGH SCHOOL OF AGRICULTURE

**PEDERSON BROS.**

Phone 281

Harmony, Minn.

Typical advertisements emphasizing the profit side of agricultural limestone applications to the soil and the nutrient value to grain, hay and pasture

it is not needed, there is very little chance of seeing any results, and this would ultimately hurt sales.

"I am certain the government payments for liming play a tremendous part in the sale of limestone. In fact, I believe that without this incentive, my business would be a failure.

"I do think that agstone should also be used because it improves the nutritional value of the crops, and helps to control erosion. However, it appears that this is the concern of the nation, just as much as of the individual farmer. For this reason I think the government should increase its appropriation for the cost-share payments to farmers for the use of limestone and fertilizer materials.

"I just wish that the public, congress, and our Secretary of Agriculture, would see this as a national responsibility, and would set up a permanent farm program including these payments along with other conservation practices. Past experience has shown us that a farmer just will not do these things on his own unless he can see a monetary gain as a result."

Mo.: "Agricultural limestone is pretty universally accepted by the farmers in this part of the country, and their main holdback in purchasing limestone is the cash that they can expend on this. As you know, we have had a severe drought in this part of the country during the last two years, and the farmers have been hard hit because of this. I do think this drought has indirectly helped the limestone business for the pastures that have been limed have stood up much better than the unlimed pastures.

"In our opinion, there is no doubt that 90 percent of the farmers know

the value of limestone to their soil, and our business last year, even though it was handicapped by the cash shortage, was still close to normal.

"As far as we have been able to determine this year, the soil testing has not hindered the delivery of agstone. We have urged all our haulers of limestone to urge their former customers to get these tests in early, and we are hopeful that the lime testing will not be a bottle neck."

Wis.: "The various points that you have raised certainly are of interest to all in the limestone business. Taking the issues that you have raised, in the order that you presented them, I believe that we will have to and should continue putting a lot of stress on the high yields that a farmer can expect from land that is well limed. The agricultural experts seem to be putting much stress on the high yields by the use of limestone or fertilizer and other good practices as an answer to lower prices. I think that we need to put a greater stress on the importance of liming soils to correct acidity and to furnish calcium for practically all of our crops rather than stressing entirely these needs for legumes. In other words, we know that corn, small grains, canning crops etc., need lime and in fact, many farmers have been sold on the value of lime from results seen from a corn crop. It was interesting to note that this year in the Pace Makers Club in Wisconsin, which is a corn yield contest, that the top yield of 169 bushels per acre had a soil test with a pH of 8.

"In regard to the canning crops, I noticed that quite a few of the progressive canning companies are using a great deal of limestone on their

land. They are being encouraged by their own experts in their National Canning Association.

"As to erosion control values we should continue to keep before the public the basic importance of liming. We need to emphasize stronger that a well-limed soil is necessary to produce hay and grass crops which are fundamental to all other erosion control practices. For example, terracing and strip cropping are not effective unless the land will produce good grass and legumes. Then, of course, the fact that liming our soil makes for better drainage and would increase the ability of the soil to absorb water should be emphasized. We stress the importance of liming and this is strongly emphasized by our college as a basis for getting results from the use of commercial fertilizers.

"You mentioned an important point that I believe we will continue to hear more about and that is the nutritional value of crops grown on well-limed soil both from the standpoint of farm animal needs and human needs. Here is where the emphasis on canning crops should have an effect on the general public. We are using most of these points in contacts with farmers in many ways. We do not put out any particular form of literature but do have many contacts with farmers through meetings and individually.

"You asked about the outlook on sales of agricultural limestone. I think that this is going to depend largely on the farmer's income. The government program is important too but unless the farmer's income is held on an even-keel with his other costs, the sales of limestone will go down. In our area farmers are well sold on the need and value of agstone. Their pocket-book is the determining factor in how much they apply each year.

"As to the A.C.P. program, that has been quite a big factor in Wisconsin because of the changes that we made. These changes have already delayed the limestone program nearly three months here. The mandatory soil tests that you asked about I believe will not be a handicap in the future but was and is a very serious handicap now for the reason that farmers had no notice that it would be a requirement; therefore, the testing of soil had not been done before winter. Then, too, those that take samples here resulted in piling the testing job onto a few laboratories that could not handle it and it has taken months to get the results back. There are other things about the A.C.P. program in Wisconsin that need to be ironed out so that they are practical. Basically, we believe that improvements have been made in it but they will hurt for a time."

Ohio: "We do use local newspaper ads, some direct mailing of reprints of magazines, articles that contain good common sense, and information

that explains to the farmer the value of liming.

"I personally have always had a small 'mad on' at advertising or anything else that refers to agricultural limestone as being a soil sweetener. I realize this is true, but that is the same thing they have said about agricultural limestone for the past 20 years. I maintain that trace elements are as valuable to crops and livestock as the calcium that everyone is talking about in aglime. This is the gospel that we preach in our territory and, as for testing the soils to find out the amount of agricultural limestone necessary to raise the pH to somewhere between 6.5 and 7.0, I think this is a weak point, especially in our territory.

"I wonder if anyone who runs limestone tests has ever found out the number of tons that it *actually* takes to bring any soil in our territory up to a pH of 7.0. I believe they will find according to some checks that we have made, that it takes quite a few more tons per acre than most people think. I think over-liming is an erroneous principle. We have had some complaints, especially in West Virginia that the farmers put on the amount of our type of agricultural limestone material that was recommended by a local SCS man and the next year another test was run and the pH of the soil was the same.

"Quite a bit of the information put out by the so-called 'experts' is so far behind the times that it is absolutely no good. Therefore, you can see why we talk up trace elements so much."

N.Y.: "It is true that agricultural limestone will increase yields, improve the nutritional value of crops and help protect land by producing a better sod. However, from talking with many of the farmers in my area I am convinced that many of us while trying to sell agricultural limestone have overlooked a very important problem that the farmer is primarily concerned with. It is to make a living which will supply him with the necessities and luxuries of life to the standard that he has set for himself without working any harder than necessary. It is because of this desire that he has used hired men whenever economically possible to increase his own income.

"With the increased cost of man labor, the farmer has gone to mechanized farming at a great increase in initial cost in order to maintain his standard of living. Over the past twelve to fourteen years this substitution of machinery for hired men has paid off very well. Also, the increased use of fertilizer has helped to increase crop yields that made the expensive machinery more economical. This has all taken place during a period of rising prices and the lack of any efficiency that may have occurred was

[illegible]

**Agricultural limestone advertisements which tie-in the dealer and spreader**

not too detrimental to the success of the average or below average farmer. But, during the past two or three years, the farmers have had a decrease in gross return. With this decrease in income, the efficiency of operation becomes more important in order for the farmer who is average or below average to stay in business. It will be necessary for him to raise more per acre and these crops will have to be of higher quality. Since he will be raising more per acre he will be able to reduce the acreage covered by crops or pasture and still obtain all the feed he needs for the same size operation that he now has. His machinery and labor will automatically become more efficient because he will not have to cover the acreage that he did before.

"The successful application of this increased efficiency depends upon the proper pH of the soil. This is where we as producers and others as teachers, county agents, and fertilizer salesmen can definitely put more effort, thus helping the farmer and ourselves in the long run.

"Notice that I have repeatedly brought attention to the efficiency of operation. This cannot be overemphasized because it ties into the nature of the human being very closely. Not one of us wants to work any harder than necessary, especially if we are the least bit dissatisfied with our work. The farmer is by no means an exception.

"I believe that if we were to place more effort in the selling of agricul-

tural limestone in emphasizing how much easier the job of farming would be and how much more money the farmer would have left, we could make a great deal more progress. Look what the machinery dealers have done advertising the labor-saving machines. Also notice how household detergent advertisements emphasize ease of cleaning and economy.

"It is my opinion that mandatory soil testing is one of the greatest changes that have happened in the national agricultural limestone program to date. There will naturally be some delays caused by the requirement of a report to accompany the orders in the local agricultural conservation office. However, in the long run a more clear picture of each farmer's total lime requirement will be had by the farmer himself. When he realizes what the total production can be after he satisfies the lime requirement of his farm he will begin to want limestone for what it is worth to him in terms of production and he will not be applying it only when he can get it for half price.

"My outlook for sales is rather optimistic. There will be fluctuations but as education progresses the use will increase. We as producers must not lose sight of the fact that the farmer is in a rather peculiar situation. The products he raises are sold in an open market and he has very little control over the price he receives, while the things he buys are priced according to cost plus profit. If we keep the level of his income in mind when establish-

ing prices, it will help a great deal to increase sales."

Penn.: "We have done quite a bit of direct mail advertising. This has been in the nature of mailing to all of the farmers in our market area advertising pieces which we have obtained through the National Agricultural Limestone Institute. We have also circularized our farmer customers by postcard urging them to place their orders with us early in the season in order to avoid delays due to delivery difficulties. We have subscribed to news release services which have gone to the local newspapers in our area, and also to the radio stations."

"I believe that because of the fact that the Agricultural Conservation Program for the year 1953 has placed a very great emphasis on the matter of soil testing, that the personal contact between our representative and the farmers either individually or in groups will be the best method of promoting the sales of agricultural limestone. It seems to us that the matter of obtaining soil samples and getting them properly tested has been more or less left to the individual producers if they do not wish to see the government program lined up in some sort of a bottleneck. I feel that in the future it will be definitely necessary to contact each farmer on a more or less individual basis and sell him on the importance of using limestone, and I think that the approach which will have to be used, is one of economics to the farmer."

"We, in our section have made contact with the local vocational agricultural teachers, and have, through them, gained contact with the future farmers of America, and I think we will be able to stimulate some interest on their part. I believe that the job that the individual producers are going to have to accomplish in some way or another is to make individual contacts with their former customers."

"Insofar as educating the general public to the use and advantages from a nutritional standpoint of limestone, this will have to be through the combined efforts of the industry as a whole. I think perhaps a good idea would be for each producer to contribute a certain amount, based upon his total sales, to a fund which could be expended for educational and advertising purposes, insofar as the general public is concerned."

Mo.: "There is little I can add to what you already know and have pointed out from time to time. However, I do appreciate your thinking in terms of *nutritional values*, as this is of *chief concern* to the general public as well as to the farmer's welfare. I have stated many times and told many people, 'it is entirely possible to eat three large meals per day and at the same time be starving to death.' This has been proven by surveys taken in various areas where a

larger percentage of the people would be suffering with bad teeth or other ailments, which could be contributed to the condition of their soil. I would not hold back on this issue."

"I think agricultural limestone sales will be better in 1954 and the reason is that there has been more farmer education."

"One principal obstacle is that the Extension Service is understaffed and overworked. They are reaching only a small percentage of the farmers in their counties desiring help and advice. Considering the number of university agricultural graduates, this condition is a disgrace."

N.Y.: "I use the various N.A.L.I. folders in all letters to farmers, year around ads in local newspapers (both classified and display), ads in all local farm publications, school publications and bulletins of farm organizations. In my ads I stress quality of product and service, such as spreading, delivery to farm, convenience of pickup at plant, etc."

"In addition I take an active part in all our rural community affairs where I keep myself and my product before my customers."

"I think that the new soil testing provision is a step in the right direction. I believe that it will encourage the use of the necessary amounts of lime on the soil to impress farmers as to its value and thus increase sales."

Mo.: "Missouri's mandatory soils testing program under the A.S.C. program is not expected by the M.L.P.A. board to slow down Missouri's agstone program in 1954. Some believe the testing program will enliven agstone sales, because producers are putting men and ideas to work in helping farmers take samples, in having them tested by county testing laboratories, and in taking agstone orders. For example:

"(1) A central Missouri producer has employed a very competent farmer and former county P.M.A. chairman to be a field man. This man will go to a farmer, take along a supply of soil sample bags, and with the farmer will actually remove samples from fields from whence he takes them to the county laboratory. In a week the results are known by the farmer and the fieldman, and the order is taken then and there. The producer pays for the testing, in this county. The producer handles all kinds of fertilizers—agstone, raw rockphosphate, superphosphate, blended fertilizers, nitrogenous fertilizers including liquid ammonia."

"He believes that he could not afford this field man unless he was selling fertilizers of all kinds. This producer also digs ponds and builds terraces. He can do a complete soilbuilding job on any farm in his county."

"(2) A northwest Missouri producer is handling his testing program by offering to pay for all soil tests on a

coupon basis; that is, this producer advertises regularly in the county newspapers (weeklies) and each advertisement includes a little coupon that is good for one soil test. (These Missouri soil tests cost \$1 each.) He has had many takers and says these little coupons are bringing him much new business."

"(3) Another producer in northeast Missouri is using a different version of this coupon method of paying for soil testing. He is advertising to all farmers through newspaper advertisements, that he will take the costs for testing soil off the total bill for agstone. In this case the farmer must buy agstone from this producer if he gets a free soil test."

"Limestone is moving at a good clip in Missouri. We will end up ahead of 1953, provided we get more rain in 1954 than a year ago. No one can sell agstone over a 3-year period in a desert."

Mo.: "I am not sure that I believe advertising is going to influence the farmer very much, except perhaps on pasture improvement and resulting resistance of grass to drought and increased vigor in livestock. I think the agstone business has grown due to one doubter seeing and hearing what benefit his neighbor has received. In this county we have experienced that our tonnage rises and falls with the size of the government allowance."

"A tremendous amount of good advertising should be done to educate the general public, and it would take a tremendous amount, in my opinion. The amount of profit to the ton does not warrant much of a percentage to be spent that way. It certainly cannot be compared with fertilizers and farm equipment, etc. I do not know how many years it took the government to put fair standards into law, but I imagine it will be centuries before they require a grocer to stamp his products with the information about the kind of soil his goods were produced from. I think one approach to the general public is to acquaint them with the amount of lime each person requires per year, as well as other elements which cannot be assimilated until released by calcium. The results of insufficient lime to the body should be stressed, such as experienced in the examinations of boys for the service—poor teeth, bone curvature, asthma, and many other deformities, and the types of ailments which result from eating animal flesh which has been poorly nourished, etc."

"I am convinced that the proper care of our soil is a national responsibility and should be handled by the Government. Perhaps the A.S.C. (or P.M.A. or A.C.P.) approach is not as good as can be devised, but some type of incentive payment, if it has to be called that, or 'sharing the load,' which I prefer, should be carried on. More advertising should be done in

(Continued on page 150)

# AGRONOMISTS GIVE FACTS

## To Aid in Selling Agstone

SOME OF THE LEADING STATE AGRONOMISTS have come up with practical approaches to the problem of stimulating more interest in liming to farmers. Many of their ideas may be incorporated into the aforementioned approach to selling the farmer on liming and fertilization to improve his farming efficiency.

They point out that liming can very substantially reduce fertilizer costs, which fact the farmer should be made to appreciate. In the case of phosphate, liming to the proper degree, even in soils of low phosphate content, will result in the fixation of what would otherwise be an unused element to tri-calcium phosphate which can be taken up by the plants. That accomplishment alone will often more than justify cost of the liming material. Liming will also make nitrogen from the air available as fertilizer, through the growing of legumes for plowing under, to an extent that would pay for the cost of liming many times over. It will also prevent excess consumption of potash by plants, it having been established that the more calcium taken up by plants, the less will be the potash take-up proportionately. With potash costing ten to twenty times as much as agstone, the saving to the farmer can be considerable.

Over-liming is a very rare occurrence particularly in heavy soils and those heavy in organic matter, say the agronomists who point out that liming to pH 7 instead of just to pH 6.5 is very often preferable. Liming to pH 7 will hasten the conversion of less available phosphate to readily available calcium phosphate and may therefore be recommended practice. The advantages of so doing, according to one of the nation's leading agronomists, are so great that any reduced solubility of boron and manganese that may result from liming to pH 7 becomes unimportant. The cost of adding small amounts of borax and manganese sulfate to compensate would be very small when compared to the savings in phosphate fertilizer that may be realized.

The increased use of the various commercial fertilizers, and the much greater use of nitrogen in particular during recent years, can also be pointed to as a reason that the farmer must be certain that his soil is adequately limed, since heavy use of nitrogenous fertilizers to replace depleted organic matter leads to acidity.

Another point brought out is that it often pays to fertilize and lime the subsoil as well as the topsoil particularly where there is heavy, light

soil with a poor subsoil base. Roots would then penetrate deeper and become bigger, thus enabling plants to better withstand drought conditions. Also, the fact that a soil becomes more granular as the result of proper liming may be interpreted in the light of advantages in reduced power costs for tillage and in the reduction of weed formation, said one agronomist.

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**•Agronomists point out that adequate liming can reduce fertilizer costs, make nitrogen available through legumes, and prevent excess consumption of potash**

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He also emphasized the need for proper procedure in spreading and mixing so that faster results might result.

One agronomist compared agstone with other commodities, from the standpoint of selling, pointing out that there is no need to create markets for agstone and that it resolves down to promotion and selling. He thinks that the price of agstone should be raised sufficiently to glamorize the product like other commodities are merchandized and that more recognition be given to the power of advertising. Savings to the farmer through the need for buying less protein concentrates to add to the higher grade hay that may be raised on well-limed and fertilized soils, were mentioned as another sales point.

In a separate article herein, Dr. William A. Albrecht, University of Missouri, says that the idea of fighting acidity needs to be forgotten and that the correction of soils deficient in calcium and magnesium should be given proper recognition as the real service of liming. Liming, he says, builds up the soil and stocks it with a "sustaining fertility" in the less rapidly acting fractions of stone along with the finer fraction. Liming is the application of fertility elements, he emphasizes, involving much greater quantities than other elements in fertilizers, which makes liming a major fertilizing performance which should be so recognized.

Many other ideas are advanced in comments received from agronomists which we quote directly in the following. With the farmer harder hit than other segments of business and the growing competition for his sales dollar, these ideas deserve careful consideration. Taken together, the suggestions offered combined to present a sound approach to the cost conscious

farmer. Comments from letters were as follows:

"The immediate response of crops to limestone applications on acid soils is an established fact. We often forget about the gradual improvement in soil productivity which may also occur. This improvement comes about through increased crop residues returned to the soil and a favorable environment for the soil bacteria. The soil bacteria decompose the plant residues to provide humus in the soil. Humus in turn improves the soil by increasing its ability to improve the soil structure. This increase in soil productivity enables us to utilize added fertilizer more efficiently and also to more effectively use the available moisture for crop production.

"For a program of permanent soil fertility, lime where needed plays an important role. Infertile and 'worn out' soils may often times be restored by appropriate farming practices. The liming of the land to provide a suitable environment for the crop and the bacterial decomposition of it into humus play a leading role in the restoration of the production capacity of these soils. Crops such as alfalfa and sweet clover which require a well-limed soil are crops which build up soil productivity the fastest. A combination of these crops with liming and proper fertilization practices has been used by many progressive farmers to build back productivity into the soil."—S. A. Barber, Associate Professor, Purdue University Agricultural Experiment Station, Lafayette, Ind.

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"I have two rather strong convictions about the desirable, but often overlooked, points in regard to the future use of agricultural limestone. The first is the need to sell limestone on the basis of its merits, and the second is to recognize that limestone is only a part of a soil improvement program and not a complete program in itself.

"The first point is one which can be discussed with people directly involved, but it is extremely difficult to write about it without being misunderstood—if understood at all. There are those who would say that my attitude has a political bias or that I am not sold on limestone or that I am not familiar with farmers' reaction towards buying limestone without government assistance and other such points. Such things are not a basis for my conclusions.

"The effects of Washington economy measures do not disturb me. But, frankly I am quite disturbed about

the reaction of the industry to such moves. Limestone can and should be sold on its merits. It can very ably stand on its own feet. Certainly government payments must be given very great credit for the expansion in the use of limestone. However, there has been a great void in the handling of the limestone sales program from the inception of incentive payments until the present time. If we are truthful with ourselves we must admit many farmers now look upon limestone as being worth only one-half of the price which it costs and that they can afford to use it only if Uncle Sam pays for the other half. Unfortunately, many in the limestone business are knowingly helping to promote this point of view. In my opinion, if the industry would put as much effort into selling limestone on its merits as it has often done in behalf of federal appropriations as the basis of support for the industry, the limestone business would do all right after recovering from the temporary shock caused by reduction in government payments.

"With the attitude which has been developed, there is bound to be some overall reduction in liming use with drastic reduction in government payments. But, the longer we wait for a shift the greater the impact.

"I recognize this as not a popular view within the limestone industry, but I am personally convinced nevertheless. To me the use of limestone by farmers is too big and important to see the industry supplying it built around something artificial such as government payments rather than upon its real merits."—John Falloon, Extension Specialist in Soils, Cooperative Extension Work Agriculture and Home Economics, State of Missouri, Columbia, Mo.

"On most acid soils of the Midwest, limestone is necessary for efficient crop production. Farmers who are now using large amounts of phosphate, potash and nitrogen alone or in mixed fertilizers often ask 'Must we also use limestone?' The answer is definitely 'Yes, if you wish to get full returns for your investment in fertilizer and in land and labor.'

"Illinois has had a soil testing program for many years and a record of tremendous tonnage of limestone used. In spite of this, many farmers are still growing poor crops on acid land. Approximately 40 percent of the soil samples now being received in the Illinois testing laboratories are sour.

"Failure to use enough limestone or to make renewals soon enough is a common mistake. Farmers often comment 'I just didn't realize it was so long since I limed that field!' A record book should be used to keep account of the treatment, the crop and the yield of each field each year.

This, together with soil testing and a close observance of the legume growth will serve as a reminder when reliming is needed.

"Alfalfa and sweet clover are our best soil-building legumes because of their deep rooting habit and their ability to contribute large amounts of nitrogen-rich organic matter to the soil. However, these good soil builders are the first to suffer if liming is inadequate. Without enough lime to support them the farmer must be content with second-rate legumes and frequent failures.

"On most of the sour soils of the corn belt, limestone properly used is still the number one soil treatment material in terms of dollars returned for dollars invested."—L. B. Miller, Agronomy Dept., University of Illinois.

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"I think it well to point out that even though the farmer's purchasing power is somewhat reduced over what it was just a year or so back, it is still far higher in terms of liming materials than it was a few years back when the means of handling and distributing limestone were much more difficult and laborious. Before the days of truck spreading, farmers had to go to unusual lengths or ends to obtain lime, let alone the job of transferring it from cars or trucks to spreaders and then to the fields. Now the farmer who is very busy and is still short of labor finds it a simple thing to obtain liming materials and to get it at what is still a reasonable cost.

"Liming where needed is still as essential as ever in establishing and helping to maintain the desirable legumes such as alfalfa, clover, sweet clover, etc. The investment per acre in these crops is still high and if a farmer can save the stand through liming, which is often true, then the cost of liming is reduced to almost zero. With a seeding cost of \$4.00 to \$6.00 per acre for these legume-grass combinations, it does not take much figuring to show that such a loss would pay for a great deal of liming. It should be stated further that this is not the total loss at all but only the beginning, as the failure of these legumes denies the farmer the hay and pasture crop that he was looking forward to the next year and also the fertility value of the residue of these legumes that will later on be plowed up for corn or other crops in the rotation. So the picture in this respect is not changed except that the legumes are somewhat cheaper and the loss is not as great as a few years back.

"Many farmers today are faced with the problem of reestablishing their legumes and pasture crops which have been taken out with drouth, and it is highly important that they use every good practice to

help to insure a stand as without these they are in a precarious position with respect to their feed supply and the needs of their various classes of livestock. These farmers of necessity must get back into the hay and pasture program or be very severely handicapped in their livestock business. This applies to hay, pasture and silage crops.

"In the feeding of hogs, a good legume will replace a great deal of supplement. Pasture legumes will save from 5 to 10 percent of the grain feed and 40 percent or more of the supplement which at the price of supplement today is a very satisfactory saving. Such a program, I believe, also ties in with the demand today in the market for meat-type hogs which are produced with a better balanced ration that does not develop unduly the lard-type hog.

"There is, of course, the importance of stressing the mineral content of roughages in which the excess mineral is available rather than in the grains. The adding of minerals to soil such as phosphorus, calcium, magnesium, etc. so that they are maintained in a desirable level for livestock utilization and livestock health are still to be considered."—M. O. Pence, Extension Agronomist, Purdue University, Agricultural Experiment Station, Lafayette, Ind.

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"During the past year we have been working closely with limestone producers in the state, the state A.S.C. office and our state chemist on the liming program. As you probably know, the job of getting optimum use of limestone here in western Oregon on our acid soils is a much more difficult problem than in most parts of the Midwest. Most of our limestone sells for about \$10 a ton or more, delivered and spread. This is about two to three times the price in many Midwest areas. Since most of our limestone must be hauled a considerable distance, we have a considerable freight charge. Consequently, we are working together to stress the importance of quality limestone. A score card system is used to evaluate limestone in Oregon based on fineness and carbonate content. Our limestone recommendations, based on soil tests, are made on the basis of one ton of 100 score lime. The actual amount of limestone to be applied is then adjusted, depending upon the quality of limestone available.

"Most of our soils in western Oregon are moderately to strongly acid. Our need for lime on these soils is far greater than present use. We hope to initiate some experimental work on the use of limestone."—H. B. Cheney, Head, Department of Soils, Oregon State College, Corvallis, Ore.

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"At the Storrs (Connecticut) Agricultural Experiment Station, Ladino

clover-grass or alfalfa-grass seedings, without any fertilizer nitrogen, have produced annually forage containing from 1000 to 1500 lb. per acre of protein. Those amounts of protein cannot be produced by grasses alone even if 100 or more pounds per acre of fertilizer nitrogen, costing over \$15, were applied every year. But the legumes will not thrive and yield those large amounts of palatable, nutritious forages unless the soil acidity has been reduced to low levels (pH 6.0 or above) by adding lime.

"Based on many experiments, it requires about three tons per acre of ground limestone to reduce the acidity of Connecticut's previously unlimed fine sandy loam soils from pH 5.2 to pH 6.5 and an average of about 500 pounds per acre per year to keep them from getting too acid again for legumes and most vegetables.

"The soils of many unlimed orchards have become so acid and deficient in magnesium that they no longer produce profitable crops of fruit regardless of how well they are fertilized and sprayed.

"Lime might be considered the 'wheel-horse' among the plant nutrients or soil amendments. If one could rate them in importance, calcium or lime would be at or near the top of the list.

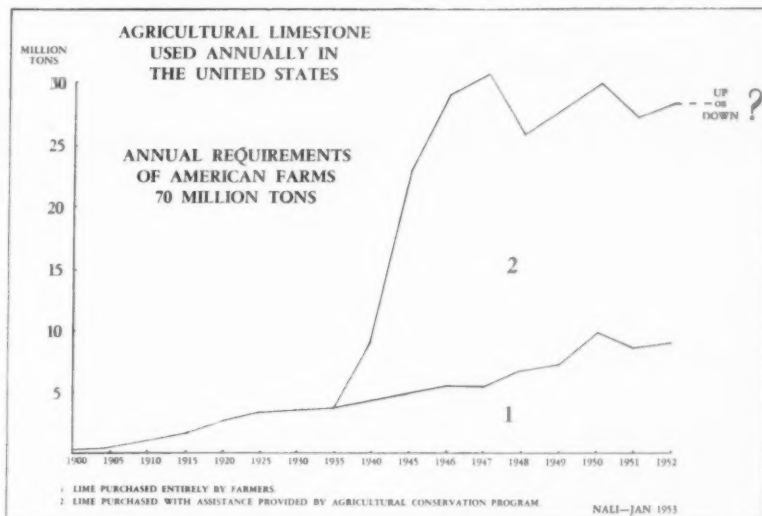
"Lime gradually moves downward in the soils of humid regions and if moderate surface or top-soil applications are repeated every three to four years, the *sub-soil* will also become richer in calcium, less acid, and, of course, a better medium for the roots of plants. By applying heavier amounts to the top-soil, the rate of penetration and the decrease in acidity of the *sub-soil* will be increased.

"There are very few crops which are not benefited by the liming of acid soils and acid soils predominate in the Northeastern States.

"Among the tens of thousands of soil samples tested for Connecticut farmers, only an occasional one has been over-limed, that is, above pH 7.0.

"In many experiments with Connecticut soils, very little, if any, detrimental effects on alfalfa, beets and turnips have been noted from liming to above pH 7.0 if borax is also added. Regardless of liming, those three and several other crops do not obtain enough boron from the soils during dry periods."—B. A. Brown, Agronomist, The University of Connecticut, Storrs, Conn.

"Now virtually all the virgin land that was suitable for cropping has been brought under production and our population is rapidly increasing, we find it necessary to step up acre yields materially. Both economy of production and necessity for increased food supplies make this imperative. To do this, however, requires greatly increased use of fertilizer. Now that the original supply of accumulated



Curves showing trend in application of liming materials, National Agricultural Limestone Institute

organic matter has been largely used up we find it essential to add large amounts of nitrogen fertilizers. Many of our corn farmers, as well as those engaged in the production of potatoes, tomatoes, vegetables, and truck crops, are applying over 100 lb. of actual nitrogen (N) an acre. Much of this nitrogen is supplied in forms that have a marked acidulating effect on the soil. Thus 180 lb. of limestone is used up in neutralizing the acid effects of 100 lb. of nitrogen in the form of anhydrous ammonia. And about three times that amount of limestone is required to neutralize the acid developed in the soil when sulfate of ammonia is the source of nitrogen.

"It is apparent from this that in proportion as more nitrogen is used to step up crop yields more limestone will have to be applied to get rid of the resulting acid. As more nitrogen is used, more potassium is required. And as more potassium is applied there is greater need to add more calcium to keep the bases in the exchange complex of the soil properly balanced. Otherwise, crops will contain more potassium than is actually required and their content of calcium will be correspondingly lowered. This is bad practice not only in terms of the mineral value of the crop but in terms of economics, since potassium is a much more expensive element than calcium.

"In our opinion, the exchange complex of soils should contain Ca, Mg, K, and H in the ratios of about 65:10:5:20, respectively, expressed on an equivalent basis. Only by continuing to apply limestone in liberal amounts can any such ratios be maintained in humid regions. The burden of seeing that this is done is placed at the door of the producers of agricultural limestone. They have a lot of competition in the fertilizer industry, which is convinced that most of the nutrient

deficiencies of soils and most of the nutrient needs of crops can be met from the fertilizer bag. And it is surprising, the extent to which this is true. But the supplemental use of limestone in liberal amounts is important both from the point of view of economy of production and the well-being of the consumer of the produce of the farm."—Firman E. Bear, Chairman, Soils Dept., Rutgers University, New Brunswick, N. J.

## Safety Suggestion

IN A RECENT ISSUE of the National Crushed Stone Association's monthly "Accident Review," published for member companies, a safety tip was given which might well deserve consideration by all rock products producers. It was suggested that "Scotch-lite," a product of Minnesota Mining & Manufacturing Co., be used on hydrants, fence corners, and all dangerous obstructions. This product, which shines when headlight beams strike it, may be cut in the form of arrows, letters, or however desired. Some operators use it on bumpers or rear of bodies and trucks, trailers, cars, etc., for added protection from rear-end collisions.

## Mineral Wool

SALES OF MINERAL WOOL for home insulation totaled over \$50,000,000 in 1953, an all-time high, as recently announced by John W. Brown, president, National Mineral Wool Association. Another good year is predicted for 1954.

## Adds Rock Crusher

WILLIAMS ROCK Co., Clinton, Mo., has added a new rock crusher to its present quarrying operations. Agricultural limestone, road stone and chat are produced.

# Lime the Soil to Correct Its Major Fertility Deficiencies

By WILLIAM A. ALBRECHT\*

**L**IMING THE SOIL, so that this practice can build up the fertility reserve of calcium (and magnesium), has gone unappreciated all too long. Instead, we have persisted in the erroneous belief that the benefits to crops from liming result from the reduction of soil acidity by the applied carbonate. We are gradually realizing that our productive soils, under annual rainfalls abundant enough to give larger crop yields, must contain more of calcium (and of magnesium) in the exchangeable (available) form than of any other fertility element. The laboratory gadgets for measuring soil acidity in degree—and in total—have absorbed our interest so completely, and for all too long a time, that they kept us from recognizing the services by limestone in the nutrition of the crops in the field. We failed to connect the activities and ratios of the fertility elements, exchangeable and active, in the soil with the nutrition of the plant. We were oblivious to the facts (a) that calcium is one of the elements which the growing plants must find in the soil very early, and (b) that it seems to serve in setting up the conditions by which the other nutrient elements and compounds are mobilized into the roots for crop growth. We are gradually coming around, however, to see that by liming the soil we are fertilizing it with the two major nutrient elements; namely, calcium and magnesium. Accordingly, this practice is taking on a new classification and a greater significance.

Now that we view most of the plant nutrition processes as a case of the positively charged elements held on the clay exchanging from there for the non-nutrient hydrogen, or acid, coming from the plant root, the extensive soil testing is pointing out that crop production requires larger amounts of the exchangeable calcium in the humid soils than of any other fertility element. Calcium is especially important in the production of proteins. These are the only compounds capable (a) of giving cell-multiplication or growth, (b) of protecting the plants against disease, etc., and (c) of reproducing them by seeds. It is required by legumes for this reason more than for the "suitable

degree of soil acidity" of which the carbonate of calcium might have been the producer. Lime is important because its calcium (and magnesium) nourish the crops.

In order to appreciate just how much exchangeable calcium a productive soil contains, let us consider the soil test results from a good silt loam, a Corn Belt soil like the Marshall of North Missouri or Iowa. This has a total exchange capacity of near 18 milligram equivalents. This figure tells us that such a soil could hold by adsorption, and for possible exchange, 18 milligrams of active hydrogen—a non-nutrient and acid—per 100 grams of soil, or the equivalent in other positively charged ions. This would be 18 lb. of hydrogen per 100,000 of soil or 360 lb. of hydrogen per plowed acre of 2,000,000 lb. For good crop production, it is considered well that about 75 percent of the soil's exchange capacity should be taken by calcium, and from 7 to 10 percent by magnesium. These make up the maximum two of all the nutrient elements held by the adsorptive and exchange capacity of the soil, or nearly 85 percent of the total capacity. For potassium, the next item in order, the figure is 2-5 percent. This leaves but 10-16 percent of the soil's exchange capacity for all the other necessary positive ions of nutrient services to the crops.

In terms of pounds per acre of soil of plow depth, or 6-7 in. deep, these percentage saturation values as replacements in equivalents for hydrogen or acidity represent (a) 5400 lb. of calcium, (b) 302 to 432 of magnesium, and (c) 280 to 700 lb. of potassium. Even with these amounts occupying the soil's absorbing power, it would have capacity remaining to hold the other nutrients in ample amounts, especially the trace elements, and then also some capacity for hydrogen, or acidity, as the favorable soil condition. Plants are nourished better in the presence of some soil acidity.

Let us note that the amount of exchangeable calcium in this series is more than ten times the maximum of the nearest amount of anyone of the others. By finding such calcium values in terms of the requirements for plant nutrition, we begin to get some basic concept of the importance of liming for the calcium supplied



Dr. Wm. A. Albrecht

to feed the crop rather than for the carbonate incorporated to fight the soil acidity.

All of this may well serve to classify the liming of our humid soils into the category of farm operations more technical than those of merely dumping any kind of limestone on the land, and of proceeding under the belief that "If a little is good, more will be better." It puts liming into the group of skilled operations calling for a clear-cut diagnosis of the soil's condition before treatment is undertaken. Testing the particular soil for its shortages in calcium and magnesium in order to build up its supplies of these by either a calcic or dolomitic stone, or both, makes liming a prescribed nourishment of the crops. This is a treatment different from one of using the carbonate of any stone, regardless of whether calcic or dolomitic, merely to reduce the degree, or the total, of soil acidity.

Viewed from the vantage point of plant nutrition, liming the soil becomes the application of fertility elements of quantities nearly ten to twenty times as large as any of the other elements commonly used in commercial fertilizers. It becomes then a major fertilizing performance. Surely under such large amount applied according to soil test, and under the concept of lime as our foremost fertilizer, the business of limestone production and distribution should feel itself playing the major role in maintaining the fertility and productivity of our soils.

Unfortunately for the liming of the soils, like for the other fertility restorative treatments, its services in food production for all of us, rather than for profit only to the farmer, are not yet recognized nor appreciated. The 85 percent of us in the urban portion of our population do not yet feel any obligation to help maintain the fertility resources coming to

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us gratis from out of the rural area. We are set up in urban commercial businesses and industries of which the laws, economics and taxation procedures are so formulated under carefully lobbied legislation that our capital investments in them are self-perpetuating. Even for the minerals or rocks taken out of the limestone quarry, for example, the owner-investor may be allowed a depreciation, or depletion, figure as high as 15 percent of the income. For the owner-investor in an oilwell, it may be a larger amount. The capital investment in these mineral businesses is soon recovered.

### Soil Depletion

But for the mineral fertility taken out of the soil and delivered in the crops to the urban population without charge for it, there is as yet no economist or authority on taxation suggesting the justice of a depletion allowance to the landowner, or investor in that kind of real estate, for the perpetuation of his capital in his farming business. His investment in the minerals in the soil for the food production for all of us is being liquidated gradually under an economic thinking (or the lack of it) which contends that the farmer is thereby taking a profit. On the contrary, he is compelled to throw his financial, and our national, security by installments into the bargain every time he makes a sale of his products. Those of us on the urban receiving end of that transaction get those installments gratis and flush them into the sea. We are parties to the crime of soil fertility exploitation, but yet are crying against the rising costs of living. We are slow to see that such short sightedness (or absence of any sightedness) in our economic, agricultural, and other policies toward the fertility resources in the soil are undermining seriously our national security. All this is the more serious with a growing pressure on the soil's production potential by our own increasing population to say nothing of that by the rest of the world calling on us to share that potential with them.

Liming our soils deserves consideration as an operation undergirding our future security in food, and particularly those foods of high protein content. We have long known that lime is needed for legumes. We are slow to see that need as one for the production of the protein, rather than the tonnage, yield of the crop. It is lime via that route that gets us our meat, milk and eggs. Viewed in this light, one cannot escape the question whether we dare expect the farmer to continue liquidating his fertility assets under the false concept of taking a profit and at the same time ask him to purchase large amounts of calcium and magnesium to aggravate his rate of liquidation all the more. Isn't it about time that as a basic agricultural policy we design

the required machinery of economics and taxation to guarantee the self-perpetuation of the farmer's fertility capital which must feed all of us, both urban and rural?

Perhaps now that the fertility restoration by liming the soil is moving itself into the more exact category of soil chemistry for the nutrition of our plants, our animals and ourselves, should not the maintenance of the soil fertility and thereby of agricultural industry be interpreted by the same views in economics and taxation as those prevailing in other industries?

Perhaps we can bring about self perpetuation of our soil fertility capital under the agricultural business in the rural areas in the same manner as perpetuation prevails for monetary capital under all businesses in our urban centers. If that situation is consummated, then liming the soil for calcium's sake will become big business by meeting the major needs in our soils; namely, lime and other fertility-restoring helps through which there can be guaranteed greater national food security for the future of all of us.

### Lime Production

SALES OF OPEN-MARKET LIME decreased 2 percent in quantity and value in 1952, compared with 1951 totals, according to a Bureau of Mines report. A major gain in volume of output was noted in agricultural lime, sales of which increased 14 percent. Chemical and industrial lime and lime sold to the building trades each showed a 3 percent decline. Sales of dead-burned dolomite declined 2 percent. Chemical, industrial, and refractory, combined, accounted for 80 percent of total sales, compared with 81 percent in 1951. Building lime accounted for 15 percent of the total, while agricultural lime accounted for 5 percent. The number of active plants increased from 155 to 160.

Lime sold by producers in the United States in 1952, compared with 1951 sales, according to type and major use, was reported by the Bureau of Mines as follows:

	Short Tons	
	1952	1951
By type:		
Quicklime	6,190,254	6,335,729
Hydrated lime	1,882,824	1,919,783
Total lime	8,073,078	8,255,512
By use:		
Agricultural:		
Quicklime	163,138	118,673
Hydrated lime	229,245	224,946
Total	392,383	343,619
Building:		
Quicklime	216,351	252,098
Hydrated lime	974,912	982,038
Total	1,191,263	1,234,136
Chemical and other industrial:		
Quicklime	3,882,740	3,998,498
Hydrated lime	678,667	712,799
Total	4,561,407	4,711,297
Refractory (dead-burned dolomite)	1,928,025	1,966,460

### Form Michigan Agstone Association

THE MICHIGAN AGRICULTURAL LIMESTONE ASSOCIATION was recently organized by a group of Michigan limestone producers, in cooperation with Michigan State College soil scientists, in order to help promote more extensive use of liming materials by the state's farmers. A survey revealed that Michigan farmers were using less than one-third as much liming materials as needed by the soils, with the ultimate result of small crop yields, as reported by Edward D. Longnecker, Michigan State College soil scientist. Experimental work was said to indicate that "a dollar's worth of agstone applied where and at the rate needed will return \$8 to \$10 in increased crop yields over a period of 10 or 15 years."

Groundwork for the organizing of the new association was laid last December 15-16, at the "Lime and Fertilizer Conference," held at the college. Association membership is composed of the following companies: Allied Sales, Inc., Detroit (sales agency for Drummond Island Dolomite); Charlevoix Lime & Stone Co., Charlevoix; F. G. Cheney Limestone Co., Bellevue; John C. Jeffrey, Parma; Terminal Materials Co., St. Joseph; Wallace Stone Co., Bay Port; and Michigan Dock and Market Corp., Muskegon.

The first officers to serve the association are: Bela Lindenfeld, St. Joseph, president; Arthur Goff, Bayport, vice-president; Robert McCrea, Muskegon, secretary; and G. W. Croope, Bellevue, treasurer.

### Opens Sales Office

HURON PORTLAND CEMENT CO., Detroit, Mich., has opened a district sales office at 403 Colton Bldg., Toledo, Ohio. Blaine E. Miller is district sales manager.

### Opens Quarry

M. L. GREEN, Carrollton, Mo., has opened the Green Quarry, just west of Waverly, Mo. Crushed stone and agricultural limestone are produced.

# Liming Cuts Fertilizer Costs

By EMIL TRUOG\*

**T**HE EXTENT TO WHICH FERTILIZER COSTS can be cut by liming of acid soils is not as yet fully appreciated and recognized by either farmers or agronomists. That the liming of acid soils would help to make the soil phosphorus more available was suggested about 50 years ago. At about that time, Dr. E. W. Hilgard, one of the foremost soil scientists of his time, stated with great emphasis that soils amply supplied with lime produce excellent crops even though the phosphorus supply may be low. This means, of course, that an abundant supply of lime enhances the effectiveness of whatever phosphorus there may be present in the soil. If liming did no more than this alone, it would pay well to lime acid soils.

Within the past 25 years it has become possible to determine very accurately the level of available or effective lime supply in a soil by means of pH or soil reaction tests, and it has now become well established that the soil phosphorus, native or applied as fertilizer, is not at all fully effective for crop use unless acid soils are limed to a pH of 6.5. Liming to a pH of only 6 is not adequate and does not increase the availability of the phosphorus very much, if at all. A pH of 6.5 needs to be attained. In fact liming to a pH of 7 is even more effective and is advocated for all soils except the very sandy kind, low in organic matter, in which case it is better to stop at pH 6.5 until the organic matter supply has been built up. The reason for this is that in sandy soils low in organic matter, liming to a pH of 7 may seriously lower the availability of minor elements, and then we have what is called over-liming. With the heavier soils and all soils containing considerable organic matter, there is little if any danger of over-liming. In fact, I have often said that for every case of over-liming we probably have 1000 or more cases of under-liming.

Liming of acid soils greatly enhances the possibility of getting nitrogen free of charge through the growing of legumes which when properly inoculated have the power of utilizing atmospheric nitrogen of which there exists an inexhaustible supply. In fact, if the nitrogen existing in the air over an acre of land could be transformed to ammonium nitrate, the product would have a value of over five million dollars. Here is a great challenge which faces every farmer—how can he utilize this in-

exhaustible supply of nitrogen which exists in the air over every acre of his land. The answer is simple—grow those legumes which are the most effective in utilizing this atmospheric nitrogen.

The various species of legumes vary greatly in effectiveness. Alfalfa and sweet clover are the most effective, and alfalfa has the advantage in that it is a perennial and provides a premium forage—one that is high in protein, minerals, and vitamins. An acre of a season's growth of good alfalfa may easily capture twenty-five dollars worth of atmospheric nitrogen—the cost of the nitrogen if purchased as fertilizer. This nitrogen exists as protein in the alfalfa plant, which when the plant is plowed into the soil acts just like commercial fertilizer nitrogen. When the alfalfa is fed to animals about 25 percent of this nitrogen is transformed to meat or milk, and the other 75 percent appears in the excrement or manure in which form it can be used as a nitrogen fertilizer. The roots and residues of the alfalfa also contain considerable nitrogen which is returned directly to the soil.

To grow alfalfa with assurance and success, the pH of a soil should be no lower than 6.5, and 7.0 is preferable. How much will it cost to lime a soil of pH 5.5 to near 7? Usually considerably less than twenty-five dollars per acre. Moreover, when a soil is once limed to near pH 7, a ton of lime every five to ten years will keep it there. Thus, the annual cost of the lime when calculated over a period of years is low indeed, and only a fraction of the annual value of the nitrogen which it makes possible of capture from the air. The growth of the clovers and many other legumes—plants capable of utilizing atmospheric nitrogen—is in general greatly favored by the liming of acid soils.

Now, liming of acid soils performs other valuable functions besides facilitating use by crops of soil and fertilizer phosphorus and capture of atmospheric nitrogen. It makes a soil more granular, and thus, facilitates entrance of water so it may be used by crops rather than cause erosion; this granulation also lessens the power required in tillage; and finally, weed control is facilitated by making it more difficult for the weeds to compete with the vigorous crop made possible by the liming.

For full and immediate success in the liming of acid soils, several important matters must always be kept in mind: A good grade of agricultural

lime—adequate in fineness and neutralizing value, and preferably dolomitic in nature or reinforced with magnesium—should be used. Also, if the lime requirement exceeds two tons per acre, then one-half should be applied and disced in before plowing, and the other one-half should be applied after plowing and also disced in. In this way, the whole plowed layer immediately becomes well supplied with lime, and the pH of the soil throughout is properly raised. If only two tons or less of lime is needed, it is usually best to apply this after plowing, followed by thorough mixing by means of disking or other type of tillage. Unless the matters just mentioned are given full attention, do not expect full realization of the benefits mentioned.

Liming of acid soils in general farming is a basic treatment—it is a "first must" in the treatment of such soils. When properly done, the monetary returns in the savings effected in the cost of fertilizer needed, and in the increased yields of crops made possible may easily exceed the cost of the liming by ten or twenty fold or even more.

## Lone Star Safety Record

LONE STAR CEMENT CORP., New York, N.Y., recently held a special celebration in honor of the outstanding safety record achieved by the employees of its 12 operating plants, located from New York to Texas. Eleven of the plants had perfect safety records for 1953, with some of them having up to three continuous years of safe operation. The best previous records for the corporation were six perfect-record plants in 1932 and 1945, when there were ten plants in operation.

In celebration of the safety achievement, the plant groups celebrated in unison, all linked by a conference telephone setup with the home office in New York. Speakers on the special program included R. A. Hummel, chairman of the board; H. A. Sawyer, president; and John Mather, vice-president in charge of industrial relations.

## Safety Promotion Book

THE NATIONAL SAFETY COUNCIL has announced the availability of its new book of "attention-getting stunts and gimmicks," designed to help sell safety to workers in new and appealing ways. "Showmanship in Safety" contains more than 150 ideas for displays, demonstrations, stunts, awards and other interest-arousing devices.

## Stock Increase

STOCKHOLDERS of Superior Portland Cement, Inc., Seattle, Wash., recently approved a two-for-one stock split and an increase in authorized common shares from 136,000 shares to 350,000 shares.

\*University of Wisconsin

# Lime For Grass Lands

By FORD S. PRINCE\*

**T**HE TREND WITH GRASSLAND FARMING which is already apparent and which will undoubtedly be hastened by taking acreage from grain crops and putting them into grass is a very healthy movement. Surpluses which plague the country stem largely from an oversupply of grain and cotton. While not short of meat, this commodity is a luxury on many tables because of cost.

This grassland movement is one which needs lime. Legumes are the crops which respond most to lime applications. Legumes are seeded in all or practically all hay-pasture mixtures. Lime and legumes go hand in hand. Legumes respond more to applications of ground limestone than the grains which are in surplus quantity.

If all the acres that are to be planted to hay and pasture crops were limed to the correct pH which is about 6.5 the results would be amazing. Liming to pH 6.5 would accomplish these results:

1. This is the most satisfactory pH for legumes, and full yields of pasture and hay crops would be realized as far as liming is concerned.

2. Grasses in association with the legumes would get their full share of nitrogen from them and less nitrogenous fertilizer would have to be purchased.

3. Bringing the soil to a pH 6.5 reaction means that there is plenty of available calcium in the soil. Available calcium is not only needed for the nutrition of plants, but is one of the most necessary mineral nutrients for animal and human nutrition.

4. With calcium in the soil, luxury consumption of potash will be curbed. When legumes have access to a good supply of available potash they take up more of it than they need for maximum growth. As the potash content of the plants goes up, the calcium and magnesium content of the plants goes down. This power of plants to take up more of a nutrient than is needed for optimum growth is known as luxury consumption. The best way to prevent luxury consumption of potash is to have a plentiful supply of calcium in the soil. This means lime.

Dr. Bear and his associates in New Jersey have shown conclusively that the sum of bases in plants tends to be a constant. This means that the potassium, sodium, calcium and magnesium will add up to approximately the same figure for any crop, no matter if luxury consumption takes place. Thus if alfalfa or other legume takes up more potash than it needs, down goes

the calcium. Since calcium costs somewhere between one-tenth and one-twentieth that of potassium, it is easy to see the economy of using plenty of liming material—calcium. And plenty of calcium in the soil is the best remedy against luxury consumption.

5. The need for potassium in animal nutrition is obscure. The need for calcium, however, for building strong bones, teeth and perhaps other parts of the bodies of animals and humans, too, is well established. Hence the calcium level of forage and other food stuffs is especially important.

6. Plenty of lime in the soil makes other nutrients more available to plants. Aluminum and iron go into solution more quickly in acid soils. Too much aluminum in the soil solution is toxic to plants. Both iron and aluminum tie up or render insoluble the phosphorus which is applied in fertilizers. For this reason, liming up to almost the neutral point is highly desirable. Lime also assists in the nodulation of legumes thus helping to fix nitrogen. It also helps decay bacteria to break down organic compounds in the soil and make their elements, including nitrogen, more available to plants.

7. Winterkilling of legumes may be prevented to some extent by liming. Workers in Wisconsin have determined that there is more water in root and crown tissues of legumes to which ample lime has been applied. This water carries soluble protein compounds which in some way enable the plants to withstand the rigors of winter.

8. The effects of liming on the soil itself are almost too well known to discuss here. Besides lowering the acidity, liming has an immediate effect on the structure of soils, causing a rearrangement of the minute colloidal fraction which cements the larger particles into crumbs or granules. These permit of better aeration and soil water relationships.

9. Lime is one of two elements which has the greatest effect on root growth. Calcium is known to cause a greater development of the fine, fibrous, feeding roots of crops, stimulating early growth and resulting in their full development.

These are some of the effects of liming the soil for grasslands. While not a substitute for fertilizer, limestone does make fertilizers more effective, and better pastures, hay, and grass silage crops are produced when lime is applied.

Those acres which are to be taken out of row and small grain crops in the humid, acid soil area of the United

States should be limed before being seeded to grasses and legumes. Liming might be called the first step in grassland farming because these crops give the greatest response to it.

Presumably, most farmers who divert acreage from grain to grass will naturally retire the sloping land, that land which is most susceptible to erosion. Ground cover on such land is very necessary in this respect. Next to a forest, grasses and legumes are the most effective erosion control measures known to farming. The better they cover the soil the more effective erosion control will be. There are hundreds of thousands, yes millions of acres of land which will yield more feed in grass crops than they do in grain. They will do this without, at the same time, causing the deterioration of the soil by erosion. As a matter of simple fact, these grassland crops, because they fill the top soil with a mass of roots will help prevent erosion the next time it becomes necessary to plow the land.

At the rate at which the population of the United States is increasing, surpluses are actually but a temporary matter. By 1975, there will be five mouths to feed where today there are but four. Putting some of the land in grass which is in surplus grain crops today will make it more productive when again it becomes necessary to use it. By that time, we hope, other erosion control measures will have become widely adopted so that the soil will be held in place by contour farming and other proven control methods.

Grassland farming and livestock production go hand in hand. To be a good livestock farmer a man must be equally skilled in producing grassland crops. And the first step in grass production is to lime the land.

## Japanese Cement

THE JAPANESE CEMENT PRODUCERS association recently predicted that demand for Japanese cement will reach 10,000,000 tons by 1957. Total demand in 1953 exceeded the original forecast of 8,400,000 tons, and demand in the next four years is expected to be as follows: 1954, 9,150,000 tons; 1955, 9,650,000 tons; 1956, 9,850,000 tons; and 1957, 10,000,000 tons.

Cement exports in 1953 reached nearly 900,000 tons, mostly to Korea, Hongkong, New Zealand, Burma, Singapore, Okinawa, Indonesia, and the Philippines. Annual exports of cement from 1954 to 1957 are expected to average 1,200,000 tons.

## Improving Human Relations

THE NATIONAL SAFETY COUNCIL has announced that its new series of human relation training films is now available. Featuring O'Grady, the safety skeptic from the council's film "A Gray Day For O'Grady," this new 3-film set tells how a foreman learns about people.

\*Agronomist, New Hampshire

# Lime Is the Best Insurance Against Poverty

By EARL E. BARNES\*

**L**IMESTONE IN THE SOIL is the best and cheapest insurance against soil impoverishment and therefore against poverty of the man trying to make a living on the land. Much has been said about the value of limestone in the soil as a crop yield stimulant, but there is also much that can be said for it as an insurance against the soil becoming impoverished.

In times of low farm prices, and crop surpluses, it may not have much appeal to tell a farmer that if he limes he can raise bigger crops. A better approach is to call attention to the fact that it is a means of cutting the cost of what he does produce. If it allows him to raise more per acre, the cost per unit of production is bound to be decreased, because he can reduce his overhead costs as fertilizer and seed. The practice of keeping the soil neutral helps in other ways also. The quality of his hay will be such that he will be relieved from much of the expense of buying protein concentrates. Without lime the soil will become acid and the hay crop will deteriorate. On acid soils the meadow will soon run out and the land must be again plowed up and reseeded, while if the soil is well limed, it is possible to keep good producing alfalfa meadows for as much as five or more years without reseeding. Thus liming is a prime factor in keeping the cost per unit of production low.

Another thing that is known, but seldom emphasized, is that on well-limed soils, the phosphate which is added in fertilizers, which is not used immediately, is not "fixed" in the soil in as unavailable form as that which is "fixed" in an acid soil. When lime is present in amounts sufficient to make the soil neutral in reaction, any unused phosphate will be fixed as tricalcium phosphate, while in the absence of lime it is fixed as iron and aluminum phosphates, which are much more difficultly soluble and hence much less available to plants. Phosphate which is tied up in the soil in an unavailable form is an unproductive investment. That lime prevents this is shown by an experiment at the Ohio Agricultural Experiment Station.

In the old five-year rotation fertility experiment, which was conducted for more than 60 years, the east end of the plots was not limed and the soil reaction sank to below pH 5.0. The

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west end was limed regularly and the reaction never fell below pH 7.0. Fertilizer applications were discontinued on one plot about 35 years ago and the residual effects of the previously applied fertilizer were measured, by keeping track of the yields and noting how long it took for the yields on this plot to sink to the level of those plots, which had never been fertilized. On the limed end, the crop yields stayed up well for one rotation and then began to fall off rapidly. On the unlimed end the yields had always been low and when fertilizer applications were discontinued, they stayed low. It seems impossible to draw on the residual fertilizers, which had been applied in the past. This indicates that on the limed land the residual fertilizer elements, were released rapidly, allowing the farmer to cash in on them, while on the acid soil the residual fertilizer elements were released so slowly as to have very little effect on the crop yields. They were always only a little better than those on the unfertilized land, and the accumulation of fertilizer elements must have been large. But when additions were stopped, the yields were not affected much, indicating that the crops were not able to use this accumulation of fertility elements in the soil. This shows that on neutral soil the farmer can turn his fertilizer dollar more rapidly and thus make more money out of it.

Without lime, deep rooted legumes cannot be grown successfully. This will soon make itself felt in poorer drainage, and poorer water penetration, resulting in more surface runoff, with its attendant sheet erosion. Deep rooted legumes are important in opening up channels in the subsoil, which allow the water to drain away. These deep roots also encourage deeper penetration of fish worms, which also leaves holes that are important in allowing excess water to find its way through the subsoil to tiles or lower strata, which are porous enough to allow the excess water to escape. When deep rooted legumes no longer grow, the holes which were made when they did grow, soon fill up and there is a noticeable lessening in the rate at which water enters the soil and drains away.

About 35 years ago I was visiting a farm in Paulding County, Ohio. The farmer and I were in the barn looking at a 20-acre field, which lay just to the south. About half of the field was

covered with water puddles, from a heavy rain which had fallen the previous night. The other half was wet of course, but there were no puddles visible. The farmer asked me what I thought made the difference. I told him it looked as though only one side of the field was tiled. He said the whole field was tiled alike, and the difference was that he had just plowed down an alfalfa meadow on the one side and an alsike meadow on the other. The alfalfa roots had penetrated so much deeper that the water was able to get to the tile much faster on that side of the field.

When water drains through the soil rapidly after a heavy rain, rather than running off the surface, it not only prevents surface erosion, but it aids in ventilating the soil. As the water passes through, it sucks in air after it. Roots can grow only where there is air in the soil, so good ventilation of the soil aids in deeper root penetration of such crops as corn. With deep roots the corn plants are able to survive dry periods better and also allow the plants to forage over a greater volume of soil for the minerals they need. When the surface soil drains out quickly after a heavy rain, bacterial activity of desirable types is not interrupted for such long periods, and such desirable chemical changes as nitrification are not long interrupted. Also a good oxygen supply in the soil is insurance against the formation of many toxic substances, which form in the soil in the absence of air.

Finally it would seem that limestone is the best insurance the farmer has against his farm "running down." If he has to curtail the acreage of certain crops, he can seed the vacated fields down to legumes, and build fertility to be drawn on when economic conditions are more to his advantage. Without lime the field grows up to weeds, and a valuable opportunity is lost.

## Stock Bonus for Veteran Employees

BASIC REFRACTORIES, INC., Cleveland, Ohio, recently honored its veteran employees at an "old-timers" dinner when gifts of stock were presented to all employees who had served the company for 25 years or more. The company distributed 1832 shares of common stock to 58 employees, each employee receiving one share of stock for each year of service. The two oldest employees received 48 shares each.

## Acquires Gravel Property

OHIO RIVER SAND AND GRAVEL CO., Parkersburg, W. Va., has acquired two Ohio River islands, Grape Island and Bat Island, W. Va., for the purpose of dredging sand and gravel. Nearly 145 acres are represented in the two islands.



Michigan State College experiment showing how legumes increase corn yield: to the left, corn from one row on a plot where corn followed wheat in a no-legume rotation; to the right, corn from one row on a plot where corn followed one year of alfalfa. Two cuttings of alfalfa were removed. This can happen only on soil which is adequately limed

## Lime In the Soil Conservation Plan

By R. L. COOK\*

**L**IME SHOULD BE THE FIRST MATERIAL to be applied to low-base content soils. This is because it is a carrier of calcium, the essential element lost in greatest amount during the centuries of leaching which have occurred since the parent material was laid down.

### Why is Lime Essential?

Lime is necessary to make possible the production of legumes. Most low-lime soils are very low in easily decomposed organic matter. The wild legumes such as white clover have long failed because of the high acidity. As a result the fresh organic matter present is high in carbon and low in nitrogen, a condition which leads to a slow rate of decomposition. Furthermore, the soil organisms which change organic matter nitrogen to available nitrogen do not function in low pH soils. Their rate of activity falls rapidly as the pH goes below 6.0. Slow growth and low yields are inevitable on such soil.

Legumes decompose rapidly when they are plowed under. The nitrogen and other nutrients contained in the alfalfa are thus released quickly to serve as food for the next crop. Furthermore the carbon dioxide given off during the rapid decomposition raises the carbonic acid content of the soil solution, thus hastening the liberation of mineral nutrients from the soil particles.

The farmer of 1954 cannot wait for grass alone to do the trick. He wants

something which will build soil rapidly. Experiments have shown that a legume-grass combination is very satisfactory.

### Legume-Grass Mixtures Increased Crop Yields

Forty-five dollars was the acre value of the increased yields of corn, sugar beets, barley, and oats which resulted from the production of one year of alfalfa in a 5-year rotation on the Ferden experimental farm in Saginaw County, Mich. The comparison was made with the value of the same crops produced on similar soil where alfalfa was not grown. As an average for 10 years, corn yields were 18 bushels higher where the crop followed alfalfa than where it followed wheat in a non-legume rotation. The differences in yield during the latter part of the 10-year period were much greater than those obtained during the earlier years. Such benefits from legumes are possible only on soils which contain an adequate supply of lime.

### Grassland Farming

Some farmers have turned entirely to the production of forage crops. Others have gone part way in that direction. On erodible soils, such changes, either in total or in part, have been frequently recommended by soil conservation experts. Cattle or sheep production on such farms will be most profitable where sod-forming legumes can be included in the forage. In Michigan the mixture should prob-

ably be alfalfa and brome-grass or those two with an admixture of ladino clover in some instances. The production of such legumes is impossible on acid soils. Sufficient liming should be applied to bring the pH of the entire plow layer up to pH 6.5 or higher. Some agronomists are recommending complete neutrality (pH 7.0). Where alfalfa is the only crop to be grown, or the main crop, the high pH is probably desirable. Where the total application is to be greater than 3 tons per acre, one-half of the amount should go on before plowing, the remainder after plowing. Rates of application should be determined by soil tests.

### Lime Cuts Down Erosion

This occurs as a result of the increase in organic matter which follows liming. The calcium from the lime, and the change in pH are favorable for greater activity of soil organisms, which accelerates decomposition and the production of waxes and resins. These materials serve as cement to hold soil particles together in the form of granules.

The favorable effect which liming has on the growth of legumes and even most non-legumes results in a greater constant supply of decomposable organic matter to furnish food for the more active soil organisms. Thus granulation is steadily increased. Well granulated soil is so easily penetrated by water that little run-off occurs until slopes become excessive. Thus erosion may be greatly lessened.

### Lime Makes Fertilizers More Efficient

Fertilizers play a major role in soil conservation, unit cost of production, and crop quality. It has already been shown how liming results in increases in soil organic matter and improved soil structure. Those improvements bring about greater efficiency in the use of all fertilizers while the resultant higher pH is especially important from the standpoint of phosphorous availability. Iron and aluminum compounds are in a soluble form in strongly acid soils. Likewise, the phosphorous compounds in most mixed fertilizers decompose quickly in acid soils. The phosphate ions join the iron and aluminum compounds to form insoluble iron and aluminum phosphates. When the pH is raised above 6.5, the iron and aluminum compounds are rendered insoluble and the reactions with the fertilizer phosphorus do not take place.

Much evidence exists that adequate applications of the correct fertilizers bring about lower unit costs of production and improved quality of crops. Surely then any practice which brings about more efficient use of these fertilizers should be given due consideration. Liming is such a practice.

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### Summary

Soil conservation in a broad sense should include soil *building*, wherever soil depletion has occurred. On acid soils, liming should be the first practice to be considered. The soil should be tested and enough liming material applied to bring the pH of the entire plow layer to some point between 6.5

and 7.0. Thus, grassland farming will become possible and in rotation farming, legumes can be grown. All crop yields will be increased, unit production costs will fall, and better crop quality will follow. More rapid penetration of water will mean less runoff and erosion and continued high production will be assured.

Crop	Calcium Per Ton	Magnesium Per Ton
Alfalfa	28.8	9.8 lb.
Red Clover	24.2	9.2
Lespedeza	19.8	5.7
Soybeans	19.2	17.4
Sweet Clover 1st yr.	29.4	12.4
Bluegrass	6.0	4.0
Timothy	5.4	3.6
Red Top	7.5	4.4
Corn Stalks	9.2	8.4
Wheat Straw	4.4	2.2
Oat Straw	7.2	3.4

## Both Calcium and Magnesium Limestone Very Important

By O. T. COLEMAN\*

**T**O KEEP FARMING ON A SOUND BASIS, we must put the right amount of lime into our lime deficient soils. There is no substitute for liming.

Limestone supplies calcium, and often magnesium — plant foods needed by all plants. The life processes of plants and of the animals that feed upon them depend greatly upon calcium and magnesium. Lime promotes the growth of better legumes. It makes the soil work easier and increases the growth and activity of helpful soil organisms.

Lime is being removed continually from the soil by leaching and erosion, and by animals and crops. A lime-hungry soil may produce such a poor crop that erosion control is difficult, and what's more, the crops grown on it may be so low in calcium and magnesium as to cause deficiency diseases in man and animals. Proper use of lime on soils that need it may be rightly termed the "backbone" of a profitable and lasting agriculture.

Calcium, which is added to our soils when limestone is applied to them, may be truthfully called our most essential plant food. In addition, calcium helps control the balance between other plant nutrients. We must realize, however, that unless we have an adequate supply of all the essential plant nutrients, and these are in balance, we cannot expect highest production.

The calcium content of our soils depends chiefly upon the rock from which they were formed, the slope and texture of the soil, climate, and rainfall. Soils formed from calcium carbonate limestones are naturally highest in this plant food. But, on our comparatively level and in the warmer and more humid climates this important plant food is subject to considerable leaching into the lower soil depths.

Under these conditions the calcium in the surface soil that is not utilized by growing plants or held tightly on

the soil particles may be leached too deep for use by most plants. On the clay soils there is less air penetration for the formation of the carbonic acid, which helps dissolve the limestone and since these soils are also able to hold more calcium on the surface of its particles, they are usually higher in this plant food than are sandy soils. Since larger amounts of water percolate through the more level soils in our humid climates, they carry large quantities of calcium to lower depths than do the more rolling soils. Then varying amounts of calcium are removed by the various crops harvested from the land, the largest amounts being removed in legume crops harvested for hay. Although small quantities of calcium are added in certain forms of fertilizers, the most economical way to replenish its supply in the soil is by the addition of calcium carbonate limestone.

For most satisfactory production magnesium is also quite necessary. It is an essential part of chlorophyll—the substance that gives plants the green color necessary for the production of carbohydrates. Magnesium also affects plant maturity and enters into the formation of the seeds. Its lack in soils may also reduce the availability of soil phosphates. But, since it is held more tightly on the surface of the soil particles than is calcium, it is most apt to be deficient on the more highly leached soils. Magnesium deficiency is often found where removal of more magnesium in larger crops that are made possible through the proper use of calcium limestone, with the other soil treatments needed for most satisfactory production.

As noted by the following table, much larger amounts of calcium are removed by forage crops, especially legumes, than is magnesium.

If a soil test shows a need for magnesium as well as calcium, it would be advisable to use dolomitic limestone—which contains both magnesium and calcium—instead of the straight car-

bonate limestone. A rather difficult problem is involved when it is advisable to meet the magnesium needs of the soil, when the calcium needs have been previously met, or when there is already plenty of calcium in the soil. On such soils, magnesium in some other form may be advisable. Such applications would then be on the annual or short time basis rather than on the long-term basis, as is normally done with dolomitic, or magnesium, limestone, to bring the reserve supply up to an adequate level.

When spread on pastures or meadows, lime should be plowed or cut into the surface with a sharp disc, field cultivator, or spring toothed harrow. This is usually done in the late fall or early spring when the land is in best condition for working. By working limestone into the soil, you will get good results sooner than where left on the surface. Also, if adequate amounts of limestone are worked through greater depths of soils deeper rooting of legumes and most other crops will be encouraged—thus making them better able to stand dry weather.

Our Missouri soil testing program is designed to eliminate plant foods as limiting factors in bringing about most efficient crop and livestock production for better farm family living. In this we endeavor to bring the calcium, magnesium, phosphate, and potassium up to the desired level, apply the nitrogen needed for the yields planned—more on the annual basis—and use starter or maintenance applications to help supply the more immediate needs of plants for plant food and to help maintain their levels in the soil.

To take best advantage of this program one should: (1) Take, to your county agent for testing, separate composite samples of soil representing each different kind of soil in the field to be limed or otherwise treated. Each of these composite samples should be made up of at least five individual samples and should represent 7-in. depths of the soil. (2) Give him the necessary information regarding each of these composite samples, including the amount and kind of limestone and other soil treatments recently applied to the field, the kind of land, or soil they represent, the recent crops grown and the crops you plan to grow—so he can give you credit for the soil treatments you have applied that may not show up in the soil tests, estimate the effects of recent crops and better

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determine the present needs of this field for the crops you plan to grow.  
(3) With his help work out a plan for treating and handling this field or

area, that best fits the land and the farm family that operates it, so it will contribute most to a well balanced farm plan and to better living.

## Greater Use of Lime Is Paramount to Maintain Prosperous Agriculture

By S. C. JONES\*

**W**ITH THE PRESENT SURPLUSES of grain crops and other farm commodities now held by the federal government, the devoting of more land by the farmers of the nation, to the growing of grass-legume mixtures to be used for pasture and meadow crops, would seem to be the logical way out of the present economic farm dilemma. An increase in the acreage, devoted to pasture and meadow, would not only release much land from the growing of the more costly crops, but would also leave the land much less susceptible to destruction by losses from erosion and leaching of the soluble plant food elements.

Forage, grasses and legumes (clovers and alfalfa) grown together for pasture, hay, and silage—though in the past much neglected—constitute our most profitable crop, not only in Kentucky, but in the nation as well. It is the most profitable because of the large acreage involved and because it is a long-time crop and is largely harvested by livestock, thus eliminating much labor that is so necessary in the growing of other crops now in surplus. The land on which these crops have been grown has generally been much more generously limed and fertilized than has the land that has been devoted to forage or pasture and meadow crops, whereas the latter respond much greater to these practices.

The one fact that should be kept in mind is that acid soils need liming. If they are not limed, a lot of time and money is wasted in trying to grow higher acre yields of crops on them, and the quality of the crops grown is not what it should be unless acid soils are limed. Where either phosphorous or potassium, or both of these are lacking and soils are acid, lime is much more effective when these elements are also supplied.

### Lime Tremendous Help

More than 30 years' experiments by the Kentucky Agricultural Experiment Station on outlying experiment fields, show lime increased the yield of corn 27 percent; wheat 59 percent; and hay (grasses and clovers grown

together) 106 percent. These experiments were conducted on manured and phosphated land. It will be seen that lime was about four times as effective on grasses and clovers grown together as it was on corn.

Legumes are naturally lime-consuming forage and must have an abundance of lime, not only for nutrition, but because the nitrogen-fixing bacteria which live in the nodules on their roots and supply nitrogen to them, taken from the atmosphere, will not thrive in acid or lime deficient soils. Legume crops grown on rich lime soils are high in nitrogen and are the most economical source of protein feed for all kinds of livestock. This is especially true for alfalfa, the queen of all forage crops, whose acreage should be greatly expanded, not only in Kentucky but over the neighboring states and the country as a whole. The consumer now wants lean or high-protein pork and with the lean-type hog, under the proper management, in grazing and feeding alfalfa, this forage crop can play an important part in bringing this about. Lime is basic for alfalfa and will return its greatest profit when applied to this crop, especially when phosphorous and potassium are also in balance.

### Heavy Fertilizing Calls for More Lime

The need for liming the land grows with each succeeding generation, because heavier applications of fertilizer are made and greater effort is put into producing more per acre. In 1941 the farmers of Kentucky used only about 160,000 tons of fertilizers, while in recent years they have been using about 600,000 tons per year. The tonnage used in the United States in 1947 was 16,838,652, while last year, 1953, it was 23,374,580, which was an increase of 38 percent during the last six years. The percent of plant nutrients in a ton of fertilizer also increased from 20.06 percent in 1947 to 24.20 percent in 1953, or an increase of 80.8 pounds per ton. This marked increase in the tonnage of higher grade fertilizers used means higher per acre yields of crops and thus the release of more lime from the soil.

Finally, may it be pointed out with

the present high cost of production and diminishing farm prices, greater consideration should be given to more efficient production in order to maintain prosperity on the farm.

Among the many factors that might influence bringing this about, soil testing would no doubt rank highest. The greatest profit could be obtained by supplying the optimum needs of lime and fertilizers to soils to fit the crops to be grown.

## Kansas Sands For Glass Manufacture

**A**N IMPORTANT DISCOVERY in the sands of the Kaw River of Kansas reportedly could make that state one of the glass-making industrial centers of the world. The entire Kaw River basin and the valleys of its tributary streams are said to contain sand which has the basic elements necessary for production of high-quality glass, and that most of the approximate 10 percent of objectionable iron content could be removed by a magnetic separation process.

A University of Kansas professor and research men for Owens-Corning Fiberglas Corp. worked together to develop a quick and comparatively simple method of processing Kansas sand for use as a base material. Owens-Corning has converted its thermal and acoustical insulation plant at Fairfax for processing the Kansas sand. Production is about 50 freight car loads of finished material per day.

Until it began using Kansas sand as a base material, at its Kansas plant, Owens-Corning received daily shipments of 150 tons of glass sand, mined in the Mississippi River valley near St. Louis, and 50 tons of feldspar mined in West Virginia. The company reportedly now uses 200 tons of Kansas sand per day. Kansas sand, after removal of iron, is said to contain 70 percent silica (quartz) and 30 percent feldspar (aluminum oxide). The cost of screening and magnetically separating the iron from the sand was said to be about \$5 per ton.

Research work on Kansas sands as a source for base materials for fiberglass was started by Owens-Corning in 1946. Prof. Frank Bowdish, Mining and Metallurgical Engineering Department, University of Kansas, began his investigations in 1949, with the aid of two members of the company's technical staff, Arthur J. Pearson, process control manager, and Richard MacPherson, technical supervisor of glass-wool production. The Stewart Sand and Material Co. joined in the venture. Special machinery was needed for the unusually fine screening of the sand, and magnetic rollers were needed for extraction of the iron-bearing grains. The experimental operation was carried out at Stewart Sand and Material Co.'s sand plant at Turner, Kan.

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# A New Look for Lime

By WINSTON A. WAY\*

**C**ERTAIN ASPECTS of the lime situation make it unique. In the first place the limestone industry has a monopoly in the agricultural field. Lime is applied to soils for two reasons, to increase pH and to furnish calcium. Several compounds containing sodium and potassium will reduce acidity; several calcium compounds such as gypsum and calcium chloride will supply calcium. The fact remains that none of these will perform the dual purpose which limestone does, nor can any of them compete on an economic basis.

Secondly, limestone is easy to prepare for sale; no chemical manipulations have to be made as in the case of sodium nitrate or muriate of potash. Most brands are as pure as could be desired for agricultural purposes.

A third unique feature of the agricultural limestone industry is the presence of a ready potential market. Many industries have found it necessary to spend large sums creating a market before attempting to sell their product. Just walk into any hardware store and notice the luxury items for which no real need exists except as it has been produced in the customer's mind by advertising.

Lastly, since agstone is about as well suited to its purpose as a product could be, the industry is deprived of any benefits which many companies capitalize on to promote sales. The addition of new wonder ingredients to tooth paste and soap powder provides a terrific impetus to sales. The limestone industry can put out only one model, whereas the appliance industry has something new to sell each year. What can you put into lime or ground limestone to make it better? Nothing. Some individuals may take issue with this point but it is my belief that liming material should be sold for its lime content and not for any dribble of fertilizer which might be added to it.

## Industry Must Carry the Ball

The Extension Service likes to see a response to its efforts; liming programs have not provided this. The Extension Service is supposed to serve the wishes of the people who pay for it. What do the people want? Most inquiries at my office deal with seed and fertilizer recommendations, herbicides, corn varieties and management problems. I have had more inquiries about rock phosphate than lime. What does all this mean? It means that Ex-

tension will be so busy with the farmers' interests that it will have less time and inclination to talk about lime in which the farmer is not interested.

Thus the situation boils down to a merchandising problem for the industry. Some agricultural limestone companies have taken the next logical step by hiring an agronomist. However, the primary duty of such an employee is and should be to advertise and sell his product. So far the educational approach has been used which is a good honest philosophy but which does not sell agstone as evidenced by the failure of Extension. People don't always do the things which are best for them. If they did, there would be fewer traffic accidents and no milk surplus.

## Glamorize Lime

Agricultural limestone is so simple, so cheap and so well known that farmers take it for granted. It is too commonplace so they don't even think about it. Soap is in a comparable situation and its producers have solved the problem by glamorizing its product and shouting its praises in every publication and over every radio in the country. Look what soil conditioners did through advertising in their brief fling. The public soon discovered that they couldn't live up to their advertising but a reputable product like limestone would not have this trouble.

Producers are so small that their agronomists are handicapped by lack of funds. Associations which already exist could do a lot more to pool the resources of industry. I sometimes wonder how much the advertising on a box of cereal or a bar of soap costs me, the consumer. Why not raise the price of agstone by 25¢ per ton or whatever is needed to carry on an effective advertising campaign? The consumer would hardly notice the increase in price and he is accustomed to it on everything else he buys. I cannot remember of ever having seen an advertisement for limestone in any paper or magazine. I'm not saying that they don't exist but, if I have ever seen any, they left no impression whatsoever.

As much as I dislike billboards, I would suspect that their use on well-traveled country roads over which farmers travel to market, etc., would be of great help. Most billboards are crowded into heaps on the outskirts of town where one can't read them all. A lone sign outside of town with the phrase "Don't pickle your seeds in an acid soil" and suitable art work might

start the farmer to thinking at a time when there is nothing else to occupy his mind. Why not have one to remind him that this is "National Lime Week"? How about a farm radio program sponsored by the industry?

The power of advertising in today's business world has been effectively demonstrated. Nearly every major industry spends millions each year. Agricultural commodities have been tardy in using this technique. Dairy products, the fertilizer industry and agricultural chemicals are making a start. The limestone industry should not put off the inevitable. Its product is needed to maintain and increase the fertility of soils, our greatest national asset. A huge potential market and an unlimited supply exist. Industry should recognize the limitations of the Extension Service and step out to finish an unfinished job. Your welfare, the farmer's welfare, and our national welfare are certain to benefit.

## Air Pollution and Control Conference

THE AIR POLLUTION CONTROL ASSOCIATION has announced that its 47th annual meeting will be held at the Patten Hotel, Chattanooga, Tenn., May 3-6, 1954. Approximately 600 management executives and other representatives of the industries, research scientists, and air pollution control officials will be in attendance. The display exhibition will feature air pollution control equipment exclusively.

## Honors 25-Year Employees

INLAND LIME AND STONE CO., Manistique, Mich., recently honored 22 of its employees at a dinner party in recognition of their long-time service with the company. The veteran employees organized a "25-Year Club," naming George Rasmussen, who has served the limestone industry for 48 years, as president. Each of the 25-year members was presented an engraved wristwatch by A. J. Cayia, president. A. H. Heitman, vice-president in charge of operations, was master of ceremonies. Inland Lime and Stone Co., recently celebrated the completion of its 25th year in business.

## Calaveras Sales

CALAVERAS CEMENT CO., San Francisco, Calif., entered 1954 with a sizeable backlog of orders and expects again to reach a high volume of sales this year, as reported by Mel J. London, sales manager, at a 4-day conference of sales personnel at the company's San Andreas, Calif., plant. New company sales records were reported for 1953. Among the large projects for which Calaveras is currently supplying cement are Folsom Dam, Lookout Point Dam and the Waldo Tunnel project on Highway 101.

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# Are We Doing A Good Job of Selling Liming Materials?

By EARL JONES\*

**L**IMING ACID SOILS as needed is a profitable practice. The Ohio Agricultural Experiment Station at Wooster secured the following yields of alfalfa hay per acre with different liming treatments. The fertilizer treatment was the same, but a heavy application was not made.

No Lime	512 lb.
Limed to Neutrality	5518 lb.
Half as much lime as needed for neutral reactions	2339 lb.

The other rotation crops gave good responses to the lime applications.

## Are Sales Efforts Needed?

There has been a tendency for some years for the producers of liming materials to assume that farmers know its value and will do whatever is necessary to get the liming material and apply it on the land. They say that the use of liming materials is recommended by the Experiment Station and by the Agricultural Extension Service. Planned sales efforts have increased its use in many cases.

## Selling Liming Materials

I am acquainted with a Northeastern Ohio farmer who, some 35 years ago, hauled bulk limestone 11 miles from the railroad station to his farm with a team and wagon. The material was spread with a horse-drawn spreader.

Over most of Ohio at the present time the handling of liming materials has been mechanized. This is a noticeable help to the farmer, since 94 to 95 percent of the liming material sold in Ohio is bulk material.

In Western Ohio most of the material is hauled directly from the quarry to the farm with a spreader truck and spread on the land.

In Northeastern Ohio, retailers of liming materials are, over most of the territory, stockpiling liming materials in the spring and early summer so that they will be available for spreading on neighboring farms during the latter part of the summer, and this development has been gaining ground during the past few years. With this investment in equipment the retailer has a reason for calling on prospective customers. Careful spreading is the rule where liming materials

have been in use for many years.

Over the remainder of the state, stockpiling has not become a common practice and liming materials are not quickly available during the main season for their application. Local dealers who handle feed and fertilizer are usually not equipped to handle bulk liming material, and offer a hauling and spreading service.

It is essential that all local dealers

in liming materials call on their respective customers in the Spring. They can get an idea of the business available for the season and learn where liming materials can be spread during the spring and early summer. There are meadows, meadow pastures and permanent pastures that can be limed during this time of the year, although after a harvest would be the best time to go on most of the meadows.

Too much of the liming material used in Ohio is delivered and spread during the late Summer and Fall, and it is very desirable that more deliveries be made during the early Spring and part of the Summer.

More sales effort is profitable in retailing liming materials. Use the benefits secured by local farmers and the work of the Agricultural Experiment Station in your sales talk. Consult the County Agricultural Extension Agent about the local situation.

# Properly Limed Soil Is A Natural Resource

By E. R. COLLINS\*

**I**N TIMES OF TEMPORARY SURPLUS commodities, there is a natural tendency to think primarily of cutting down on expenditures which give a return over a several year period. Lime and fertilizer dollars will frequently be spent for materials which will give immediate and obvious increases in crop production.

The continuation of an emergency fertilization and liming program over a period of years could be disastrous for both present and future production. It would appear just as important to maintain the physical plant for food production, our soils, as it is to maintain the potential production power of industry by maintaining plants in working condition.

In times of emergencies, experience has shown that shortages of labor, materials, transportation, trucks, etc., makes even a maintenance liming and fertilizer program difficult without the added burden of going into these emergencies with depleted soil fertility levels.

It is interesting to note the extensive advertising program, and the large increase in the numbers of salesmen, of those industrial commodities which are being manufactured in excess of the amount which the consumer will go to the market place and purchase.

Now is no time to let down on the

salesmanship for any product needed to maintain the potential producing power of quality food, feed, and fiber. This is particularly true of liming materials. The economic response is established, and the returns will continue for several years. The nutritional value of the crops will be increased, erosion will be decreased as a result of better pastures, legumes and crop growth, and increased land values will be apparent from increased production.

## Adequate Liming Pays Off in Dollars

North Carolina Agricultural Experiment Station Bulletin No. 385, entitled "Lime and Fertilizer Pay Off," gives numerous examples of the economic return from the proper use of lime.

On a Bladen silt loam with a pH of 4.8, phosphate and potash gave a yield of 2607 lb. of Ladino clover. With lime, phosphate, and potash, the yield was 6103 lb. The four-year average return for one ton of lime was \$27.35 per dollar spent for lime.

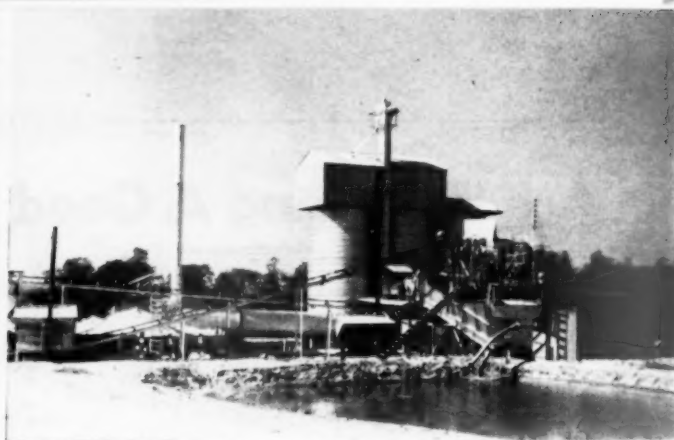
On a Norfolk loamy sand with a pH of 5.0, one ton of lime per acre gave a return on cotton of \$55.87 for each dollar spent on lime.

On a Norfolk series soil with a pH of 4.8, one ton of lime gave a return on peanuts of \$45.10 for each dollar spent for lime.

\*Extension Agronomist, Ohio State University, Columbus, Ohio

\*In charge, Agronomy Extension, North Carolina

(Continued on page 186)



Left: View of plant, showing carloading bins with rotary dryer and drain piles, to the right. Right: Other side of plant with washing plant between bins and settling pond

# Producing High-Grade SILICA From Sandstone

By BROR NORDBERG

Marion Silica Co., Inc., Marion, Ky., builds new plant costing \$250,000 for the production of glass and foundry sand. Plant produces 12 carloads per day

**P**RODUCTION OF GLASS SAND and foundry sand was started late in 1953 at Marion, Ky., by Marion Silica Co., Inc., a company which is new in the silica business. This represents the first commercial attempt to exploit a deposit of highly siliceous sandstone that has long been known to geologists as a potential source of high-grade silica for glass manufacture. A new plant was built at a cost of \$250,000, one mile east of Marion, and production is being increased as markets are being developed. Thus far shipments of glass sand have been made principally to light bulb manufacturing plants within the state of Kentucky, and outlets for foundry sand are under development. About 90 percent of the output is glass sand.

Marion is in western Kentucky (Crittenden County) in an area famous for other non-metallic minerals. It is in the heart of the largest fluor-spar producing area in the United States and one which has large deposits of barite. The silica deposit, known by geologists as the Hardinsburg sandstone formation, occurs to a depth of some 85 ft. on the highest

point in the county and is extensive. It is covered with some 4 ft. of topsoil and rests on a bed of shale which, in turn, overlays limestone of considerable depth. Described as an indurated sandstone, the deposit was laid down along the discharge route of glacial melt waters when the Ohio River valley was covered by water. Individual grains are held together with a small amount of clay and they are of sub-angular shape.

The state of Kentucky has been surveying silica sources over the State for many years in an attempt to discover silica of potential glass sand grade as a source of supply for new glass manufacturing plants, and which might be used by other expanding industries. A report, entitled "Recent Investigations of Silica Sands of Kentucky 1952," prepared by the Kentucky Geological Survey in cooperation with the Agricultural and Industrial Development Board of Kentucky, brought out that the Marion deposit was one of two in Kentucky that had the best possibilities as a source of silica for the manufacture of high grade glass.

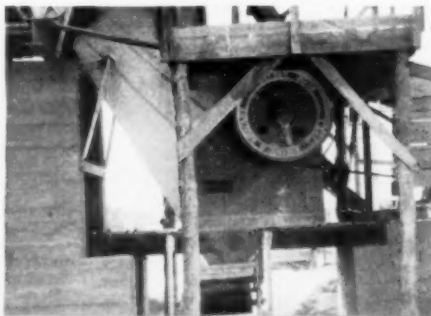
Tests have shown that this silica can be processed by crushing, sizing and washing to meet the requirements for all standard listed grades of glass, with the exception of optical glass. The grain size range and uniformity of grain sizes are excellent. From 65 to 70 percent of the grain sizes (finished product) are from 70 to 140 mesh. Fines are well below the ten percent top limitation established by the majority of glass manufacturers and the finished washed product has less than 1 percent pan (minus 200 mesh).

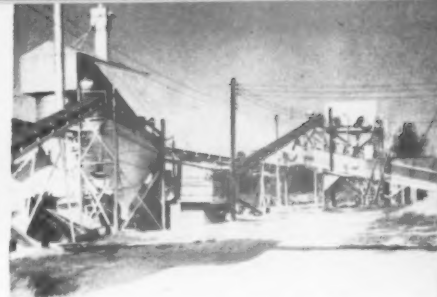
A typical sieve analysis from a washed sample is as follows:

Percent between	Mesh Sizes
5	28-30
11	35-48
9.3	48-60
38	60-80
25	80-100
9	100-150
1.4	Minus 150

As tested on sieves of different number, a representative sieve analysis of finished glass sand is as follows:

Left: Primary crusher ramp in background. Belt conveyor inclines up to vibrating screen from which oversize is put through roll crusher for reduction to minus  $\frac{1}{2}$  in. Belt conveyor, to far left, carries material to storage. Center: First stage in processing is reduction of sandstone through jaw crusher. Right: Minus  $\frac{1}{4}$ -in. material from jaw crusher is screened over this vibrating screen. Plus  $\frac{1}{4}$ -in. material is reduced to minus  $\frac{1}{4}$ -in. size, through roll crusher, below





Left: Sandstone is re-crushed through roll crusher shown here, and minus  $\frac{1}{4}$ -in. material is placed in storage for washing. Center: Minus  $\frac{1}{4}$ -in. from storage is re-screened and oversize is further reduced to 16-mesh top size. Inclined conveyor on right goes to washing plant. Horizontal conveyor puts washed sand into drain piles shown in background. Right: In foreground is screening-crushing station for reduction to minus 16 mesh. Inclined conveyor takes this product to washing plant

Percent retained	Mesh Sizes
1.7	40
8.9	50
30.3	70
37.6	100
16.1	140
4.6	200
0.8	pan
ignition loss—.41 percent	

Production is aimed at a 70-75 fineness number for glass sand and 85-90 for foundry sand.

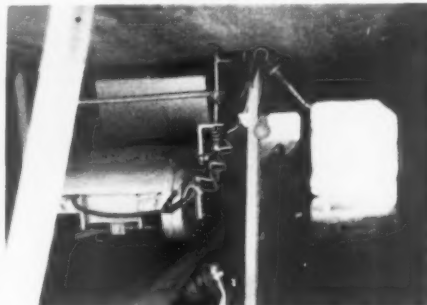
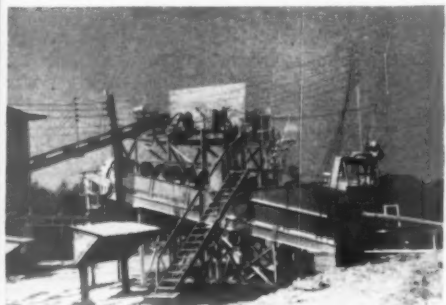
Silicon dioxide content varies a little according to the source of material

of silica and, in the process of crushing and washing, is reduced down to 0.20 percent, which is well below the 0.5 percent permissible limit for high grade glass. CaO and MgO content are nil.

Washing is hardly required for the removal of  $\text{Fe}_2\text{O}_3$  when processing selected high-grade material from the quarry, but the plant was designed with efficient washing equipment for the removal of shale and clay and the reduction of  $\text{Fe}_2\text{O}_3$ , to permit processing all the material as excavated

### Plant Layout

The plant was designed to produce 12 carloads of silica per day when in full production. It has intermediate storage provided, in order to balance production and to permit separate operation of three distinct phases of production. Quarry-run material is first crushed and screened to minus  $\frac{3}{4}$ -in. size and then put into a storage bin. Material is drawn from this bin as required, for further reduction followed by washing, and then is stockpiled to drain. After a drain period,



Left: Closeup of washing plant. Improvised washer, above, is being fed by belt conveyor. Spiral classifier, below, discharges sand to belt conveyor; overflows go into pond. Center: Vibrating feeder below bin for minus  $\frac{1}{4}$ -in. material regulates flow to belt conveyor for further reduction. Right: Closeup of feed end of gas-fired rotary dryer

as excavated in the quarry. The ledge is iron-stained on its weathered surfaces and along some of the bedding planes. Quarry operations are in a stage of early development on a 24-ft. face and the  $\text{Fe}_2\text{O}_3$  content is becoming less as work progresses into the face. Silica in the finished product as produced from the better sections of the quarry tests as high as 99.52 percent (optical grade is 99.8) and the average is a little more than 99 percent.

Iron content in the unprocessed material as excavated runs about .044 percent, and washing is effective in reducing the amount within the range of .025-.034 percent. Unwashed material has about 98.5  $\text{SiO}_2$  and contains approximately 1.25-1.5 percent  $\text{Al}_2\text{O}_3$ . The clay cements the grains

from the face without selection. Eventually, the quarry will be developed to a 70-ft. face.

Marion Silica Co. core drilled the area to a depth of 70 ft., ran exhaustive tests and then purchased 155 acres of property. Plant construction started in October, 1952, and production began in September, 1953. Overburden is removed by bulldozer. At present, the face height is 24 ft. Wagon drills with 2 $\frac{1}{2}$ -in. detachable bits are used to drill blast holes spaced 4 x 4 ft. It is expected to use well drills later, with the opening of a higher face. Excavation is done by a  $\frac{3}{4}$ -cu. yd. (304) Koehring shovel powered by a GM diesel engine. The haul is 2000 ft. down a grade to the plant, in two trucks carrying four tons to the load.

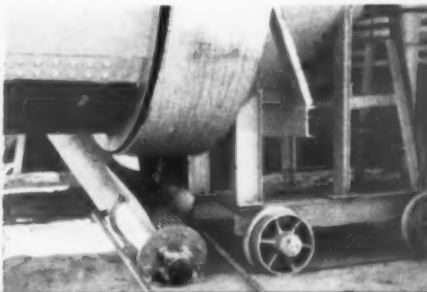
the silica is put through a rotary dryer and screened into bins from which cars are loaded.

These three stages of production permit staggering of operations. The primary plant has a capacity of 100 t.p.h.; capacity of the washing plant is 25 t.p.h.; and the dryer and screens produce 35 t.p.h. of finished product. Thus, the primary plant may be operated 5 hr. per day and produce sufficient material to keep washing, drying and screening operations continuing around the clock. In full production, the crew will consist of 15 men. A 20-car spur was built to the plant for shipments on the Illinois Central Railroad.

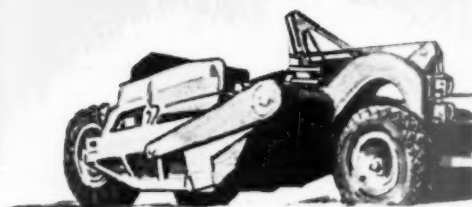
The plant is of reinforced concrete and steel construction and its most

(Continued on page 130)

Below: Views of gas-fired rotary dryer. Water-cooled, inclined screw conveyor transfers sand to bucket elevator



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N. H. Bogie, president of Marion Silica Co., Inc.

interesting feature, other than its layout, is the method developed for washing.

### Crushing

Trucks from the quarry back up a ramp over the primary crusher and dump into a hopper feeding a 36-in. x 10-ft. Diamond apron feeder which is driven through V-belt and a gear reducer by a 10-hp. motor. The feeder discharges over a steeply sloped bar grizzly to the crusher. The grizzly by-passes minus 1 1/4-in. material to a belt conveyor below the crusher, and the large material is put through a 20- x 36-in. Eagle corrugated jaw crusher set for a reduction to 1 1/2 in. It is driven by a 75-hp. motor through a V-belt with a smooth-faced pulley on the crusher.

Product of the crusher and the by-passed material are delivered by a 30-in. belt conveyor, 72-ft. centers, to a secondary crushing-screening unit.

The primary crusher mounting is high so that the tail pulley of the belt conveyor, below it, is readily accessible for repair and maintenance. An electric switch and extension cord permit the crusher operator to start and stop the feeder as required. All belt conveyors in the plant are of sectional fabrication with Iowa idlers.

The primary belt conveyor delivers over a 4- x 8-ft. double-deck Diamond vibrating screen mounted over a 40- x 22-in. smooth-faced Diamond double-roll crusher, with both rolls driven by a 100-hp. motor through V-belt and gear drive. Screen openings are 1/2 and 3/4 in. square mesh, with the top deck serving only to divide the load. Minus 3/4-in. material by-passes the crusher, to join the crusher product on a 24-in. belt conveyor, 159-ft. centers, which delivers into a bin. The bin measures 20 ft. in diameter, is 36 ft. high, and holds 700 tons of material, sufficient for a day of operation in the quarry. It is a section of Armco steel tunnel pipe with vertical liner plates for reinforcement against buckling.

Material is removed from this surge bin for a third stage of crushing followed by washing. It is drawn from below by a Syntron F33-DT Vibra-flow feeder on to a 24-in. horizontal belt conveyor, 20-ft. centers, which transfers to a second belt conveyor, 62 1/2-ft. centers, delivering to a 4- x 10-ft., double-deck Productive Equipment Co. Gyroset vibrating screen. Here, a separation is made at 16-mesh, the fines by-passing and the oversize feeding into 30- x 18-in. Pioneer smooth-faced crushing rolls. One roll

is driven and the other is trailed, running free, to take shock. The crusher product and the fines by-passed are delivered to the washer on a 24-in. belt conveyor turning on 80-ft. centers.

### Washing

A unique washer was designed by the company which is proving effective not only in separating the silica grains but in complete removal of clay balls. It is operated in conjunction with a screw classifier. The washer was designed for violent agitation of the sand in water and consists of a 6- x 12-ft. steel box, 3 ft. high, of 3/8-in. steel plate, with four shafts, each of which has three agitating blades.

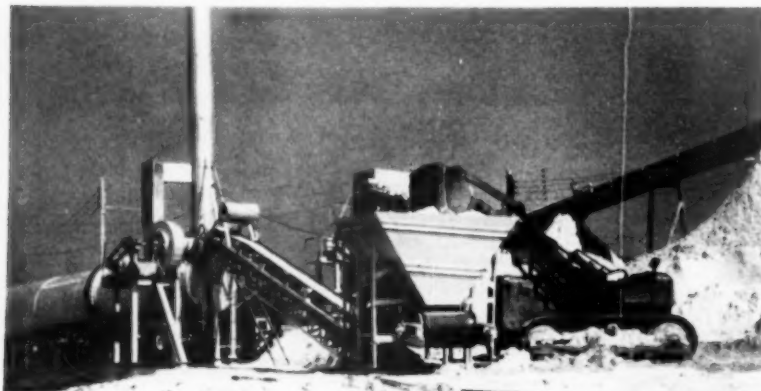
The shafts are horizontal across the entire width of the box in separate chambers and are spaced equally apart on centers. Their agitating blades are clear of the bottom. The tank has a slope of 3 deg. from the feed end. The shafts are driven at 35 r.p.m. counterflow to, or up-hill, to the stream flow. Material fed into the first chamber must work to the opposite side of the box in order to flow into the second chamber, from which it must work its way back to the original side in order to transfer to the third compartment. The process is repeated into the fourth compartment from which discharge is into the center of a 54-in. Akins spiral classifier 35 ft. in length.

Water introduced into the head of the washer and, in combination with the slope of the washer, serves to move the material through. The particles are held in suspension as a pulp, with the result that wear on the agitating blades is negligible. Total water in the system is 1800 g.p.m., of which part is added at the feed end of the washer, some is added inside the washer and the balance in the spiral classifier. The classifier has an adjustable tail board for control of the overflow. A fresh water pool is maintained in the forward end at the bottom of the drainboard in order to flush out the maximum in clay. Overflow slimes are laundered into a settling pond. Makeup water is supplied by a deep well pump and 3- and 4-in. pumps reclaim water from the pond for washing.

Discharge from the classifier, containing 20 to 22 percent moisture, is conveyed by a 24-in. horizontal belt conveyor, 100-ft. centers, to drain piles. Discharge into three separate piles is diverted by knife edges from the belt. Capacity for drainage is 300 tons in the three piles. The piles are built up on timber drain boards which will be replaced by a concrete apron. Moisture content is reduced to 8 or 9 percent overnight.

Drained material is transferred by an Allis-Chalmers HD5 tractor with

(Continued on page 180)



Front-end loader transferring drained sand to dryer feed hopper

# bouncing rubber balls

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# Theory and Practice of LIME MANUFACTURE

## Part IX. The Increasing Importance of Fuel Oil

By VICTOR J. AZBE\*

**L**IME IS AN IMPORTANT STRUCTURAL MATERIAL, but in a manner this is secondary for it is of more importance as a chemical. Lime ranks with salt, sulphur and iron ore, and it is only second to fuels in importance. It is through the medium of lime that iron ore is smelted, and it is through the medium of lime that sodium chloride produces the industrially essential soda ash and sodium hydroxide. In all of life's essential processes and throughout industry, lime in one manner or another is found to be needed. An industrialized state without lime cannot be imagined. Its applications number into hundreds. Lime is the main constituent of cement.

Lime has been made for many thousands of years. The initial kilns undoubtedly were holes scooped out of a clay bank. The model, Fig. 1, indi-

cates a tremendous advancement and creates the link between the remote past and the present, between the structureless unlined kiln of the clay bank and the large, technically highly developed kilns of today. In fact such simple kilns as this, but larger may even be found in operation today. They are satisfactory in primitive areas, where demands for lime are low, and fuel and labor cost next to nothing. However, in much of the world requirements for lime are continually increasing, and as neither fuel nor labor are cheap anymore, primitive practices can no more be condoned if there is to be industrial advancement.

Of course, when there is no limestone there can be no lime. But occasionally there is limestone where fuel is either unavailable or in short supply. In world perspective this is quite a problem today, and it is this which



Fig. 1: Model of an early primitive type kiln

brings readily shipped fuel oil into rapidly mounting prominence as a lime producing fuel.

This is not so much the case here in the United States where, excepting for California, Nevada, Florida and a few additional states, other fuels are cheap and readily obtained. It is more true in foreign lands. Virtually all of Central and South American countries, the Carribean Islands, Israel and the entire near east, Hawaii, and much of the far west depends on oil for fuel.

Some countries such as Mexico, Venezuela, and Peru are entirely de-

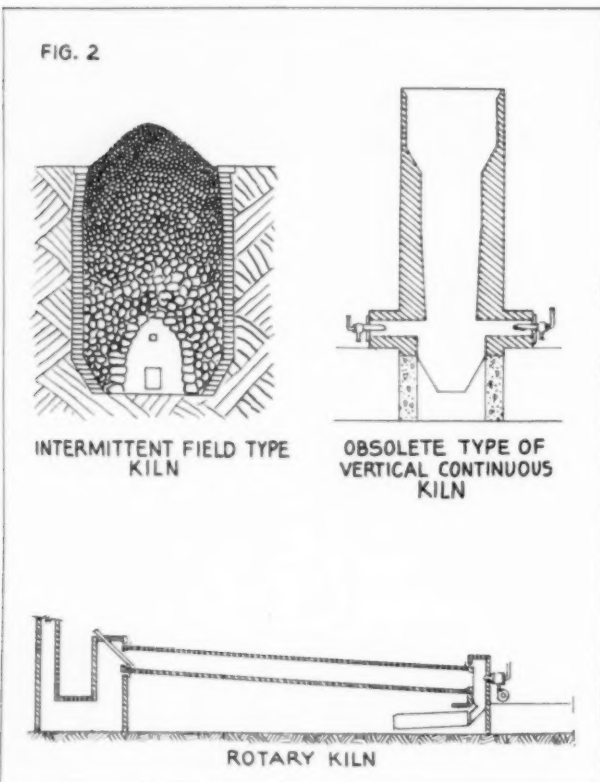


Fig. 2: Thermally inefficient oil fired lime kilns, vertical and rotary types

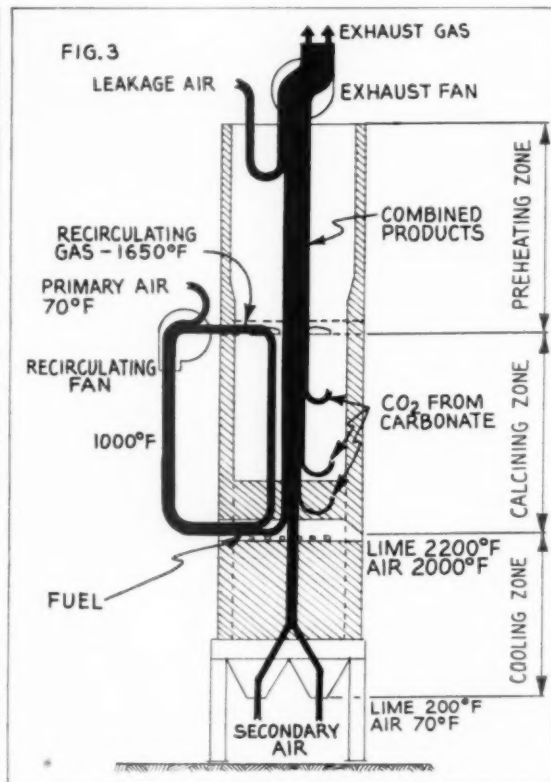
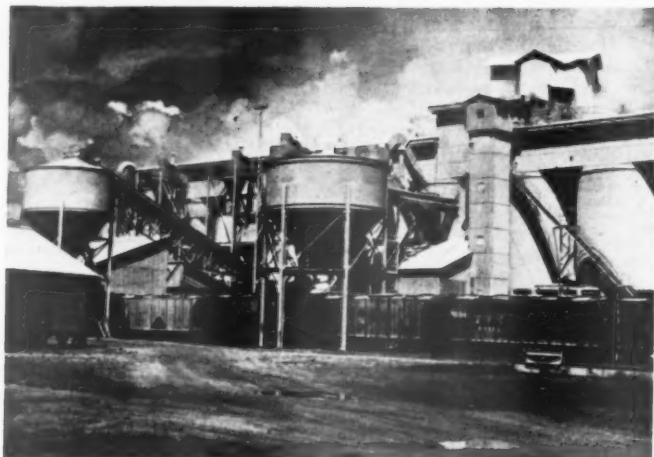


Fig. 3: Showing gas flow circuit with recirculation

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pendent on oil for fuel. Here, due to their own resources, it is relatively cheap. In others not so fortunate, as Brazil where oil field development is still in an embryonic state, imported fuel oil may cost as much as \$40 per ton.

In some of these latter locations, considerable wood fuel is now being used, but due to its wasteful application the more conveniently located resources are becoming rapidly depleted. In some climates it can be systematically grown and harvested. In others it is hauled long distances, and therefore its cost may prove more expensive than fuel oil if efficiently applied, even fuel oil at \$40 per ton.

The change from wood to oil was in a degree delayed by the introduction of the improved manner of wood fuel utilization through adoption of better kilns, induced draft operation, as well as pre-gasification, all Azbe developments. In this manner fuel consumption per ton of lime was reduced by more than half, with other benefits also being realized. However, the rising standard of living, increasing population, concentration of population, the building booms and expanding industry all tended greatly to increase the demands for lime, with all of these factors tending to simultaneously reduce the ready availability of wood. With coal only regionally available and with apparently not much natural gas in immediate sight, the interest in fuel oil is mounting. It is becoming competitive to wood and other fuels, but only if efficiently applied. Unfortunately, however, truly efficient application of oil use to lime kilns is ordinarily even more difficult than that of wood fuel or coal.

### Some Obsolete Systems

Fuel oil has been used in the firing of lime kilns for quite some long time. Up to the more recent years three systems were employed exclusively with all three being very wasteful in fuel.

The first of these is the so-called

intermittent "Field Type" kiln shown at "A" of Fig. 2. These kilns may be quite small or rather large, but in either case the operating principle is equally crude. They are charged with stone, fired and when calcination is complete, entirely emptied. The oil is fired into arched-over cavities of which there may be one or two. There is a system to the placing of the stone arches and the charging of the stone above. Oil firing follows a certain sequence but at best the stone is not preheated with waste heat and the sensible heat of the lime is lost; there is incomplete combustion and much core from the corners. Oil consumption is about three times what it should be or more. The entire cycle requires up to two weeks.

An improvement is the continuous kiln shown at "B." It is very much like the ordinary hand fired wood or coal kiln except that oil is injected with steam into the fireboxes wherein combustion air also enters. These fireboxes are usually very hot and the arches as well as the kiln walls need frequent repairs. The hot gases pass up the kiln, but their distribution through the shaft is poor. Stone is charged once or twice a day and lime is drawn every 4 to 6 hr. When drawn much of it is red hot. There is incomplete combustion, and occasionally secondary combustion with top of kiln flaming. Capacity is on the order of 8 to 20 tons per day at the most. Fuel consumption is about double what it should be. The kiln is better than that of "A," and it is a continuous kiln, but it is still far from satisfactory. However, in this case an improvement is frequently possible through modification of the firing system, of shaft arrangement, and the application of mechanical draft.

Kiln "C" is the common rotary kiln. Oil ordinarily is injected by means of low pressure air. Large quantities of lime may be produced but oil consumption is very high. It may be from two to three times as much as it should be unless the kiln is improved

with an efficient preheater and cooler, and stone is carefully selected for size. Regardless, however, of the improvements, oil consumption always is considerably greater than with a proper type of vertical kiln as only in the vertical kiln can there be the necessary intimacy of contact between the gases and the lime for most effective heat transfer.

### Oil Gasification Development

It has long been known by Azbe engineers that to develop an efficient vertical lime kiln, the subject of heat distribution must be mastered, and that to do this was impossible when wood or coal were applied to the kiln in the solid form, or fuel oil applied as a liquid. It was realized that only through pre-gasification and subsequent gas injection could proper distribution be attained. It was due to this that the special coal and wood gasification systems were evolved and the multi-port side and center burner arrangements developed.

However, the coal and wood gas producers were entirely unsuited for liquid fuels. For these something entirely different was needed. The matter was given much thought, and eventually a novel system of oil gasification evolved. The initial experimental work was done at the plant of the Hawaiian Gas Products Corp. in Honolulu, and the first two-kiln plant adapted to this system, designed by Azbe Engineers, was built by the progressive Mexican industrialist, Antonio Ruiz Galindo, Sr.

In the six years since this initial plant was built, the system was applied at such widely remote points as Israel, Guatemala, and Brazil and is now being installed in Australia, Formosa, and other sections of the world.

The general configuration of an Azbe plant with respect to systems of stone charging, lime drawing, the exhaust system, etc., may follow the same line of design in all the kilns. It is only with respect to the system of fuel oil gasification that there is a difference. This is done by means of a hot recirculating carrier gas obtained from the kiln into which oil is atomized and which serves the manifold purpose of a vaporizing, gasifying, injecting, distributing and temperature control medium as in Fig. 3.

Some hundred varied patent claims have been granted on Azbe kiln systems. Several of these would apply to any of these kilns, including that of the oil fired kiln. The one pertaining particularly to oil firing in more basic respects appears in United States patent No. 2,532,077 which reads:—"A kiln comprising a hollow shaft wherein is a heating zone for calcining, a ported hollow firing bridge below the heating zone adapted to be surrounded by hot calcined material descending from said heating zone, oil injecting means connected with said firing bridge adopted to inject particles of oil therein, recirculating means adopted to abstract sufficient-

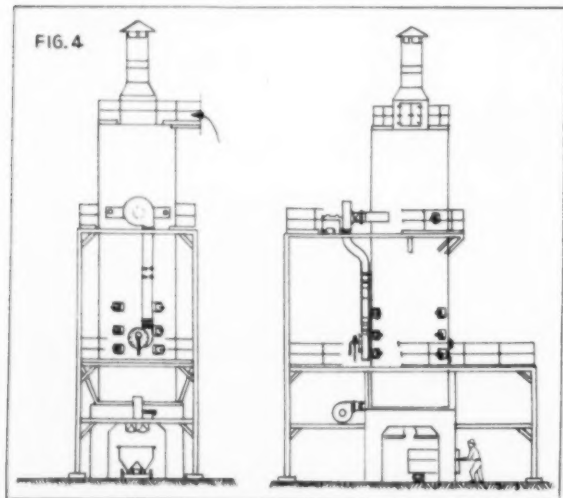
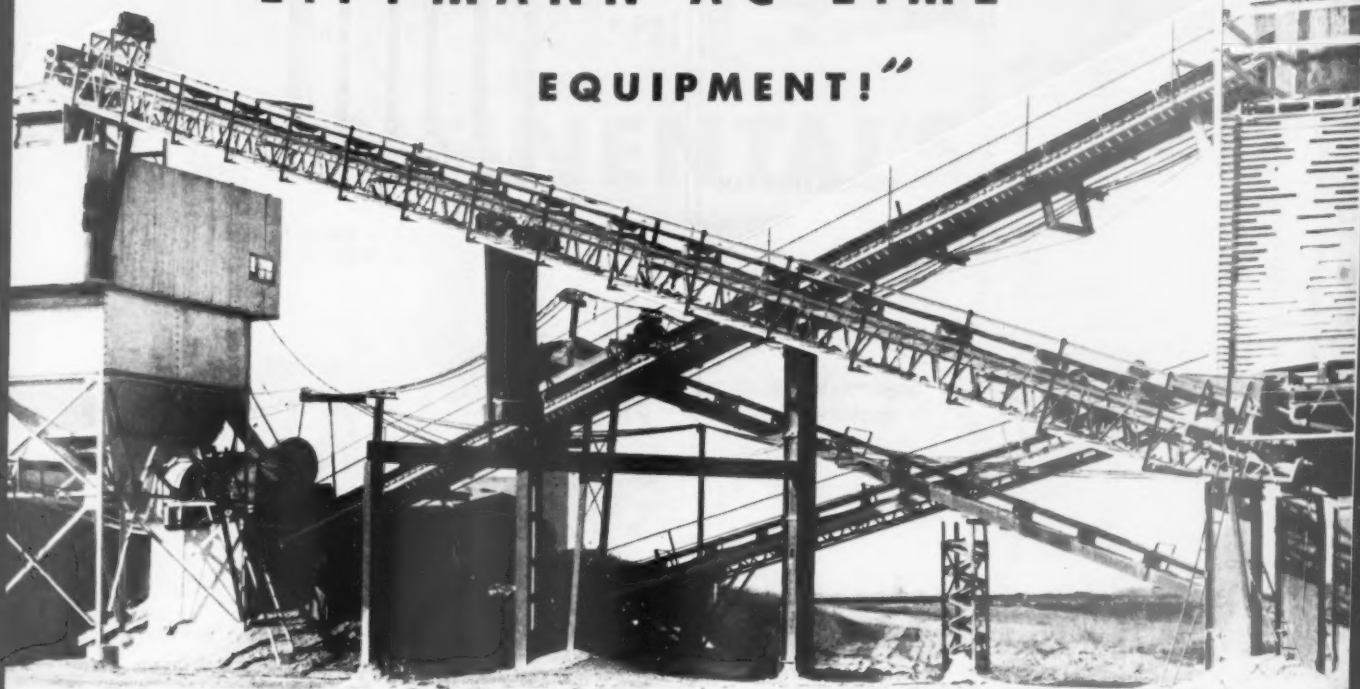


Fig. 4: A simple type of recuperative vertical oil fired kiln

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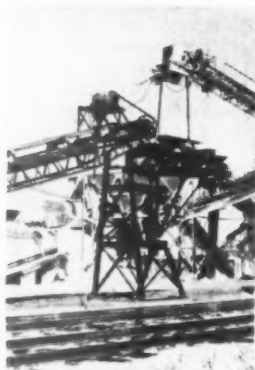
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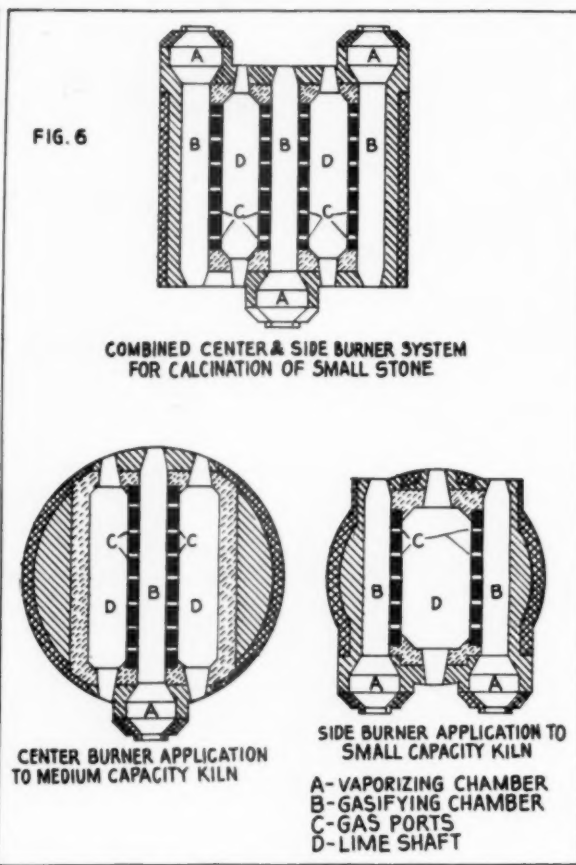
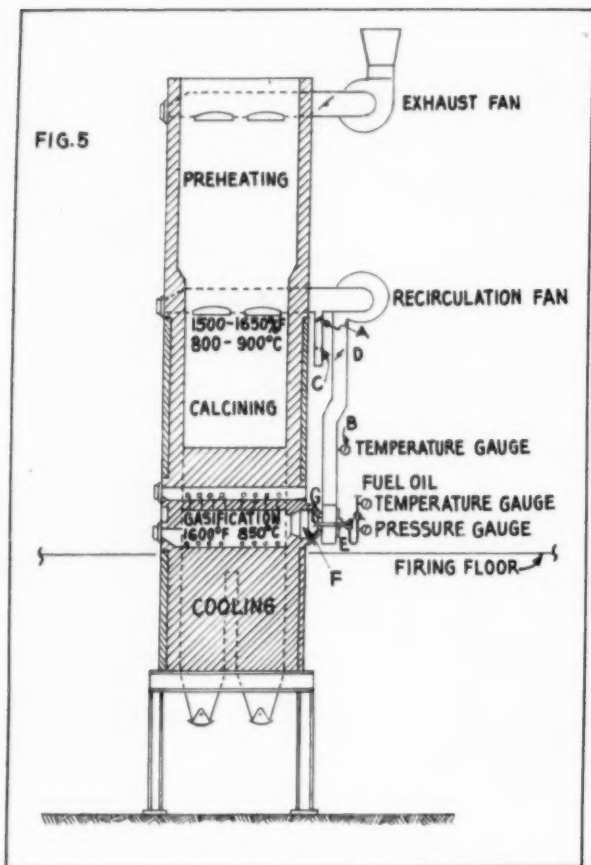


Fig. 5: Pregasified fuel oil fired lime kiln. Fig. 6: Hot zone cross-sections of oil fired kilns (Azbe patents)

ly hot gas from above the heating zone and introducing it into the firing bridge along with the injected particles of oil so as to come into direct contact therewith under conditions of suspension of the particles in said gas, means for introducing air into said bridge with said particles, the bridge being sufficiently heated by surrounding hot calcined material and the recirculating gas being also sufficiently hot in the firing bridge substantially to gasify said particles, whereby hydrocarbon cracking and oxidation of resulting suspended carbon particles are effected within the bridge and a high firing velocity effected from the same into the shaft."

In external appearance and its simplest form the Azbe oil fired kiln is shown in Fig. 4. The "recirculating fan" shown on the upper fan platform is a necessary part of the oil gasification and induction system. The lower fan is the "forced draft fan." It is desirable in that it increases the air influx and thus increases kiln capacity beyond that obtainable with mere natural draft. For a still higher capacity, there is a fan located at the top of the kiln called the "induced draft fan." Its purpose is to create a high flow—a strong draft. It is not shown in this illustration which presents only a simple medium capacity kiln.

In the case of the Mexican operation, a metric ton of lime is obtained from 110-125 litres of Bunker C oil, which is 26.5-30 gal. of fuel oil for each short ton of lime. This represents a heat consumption of between 4 to 4.5 million B.t.u. high heat value per ton which is very good indeed. They further state that kiln running periods are on the order of years without refractory repairs, which is made possible through kiln temperature control by means of the recirculating stream.

Ordinary oil fired kilns of the continuous type, in which oil combined with air is directly applied, are subjected to high temperature intensity and so are subject to rather short runs between repairs. These kilns tend toward incomplete combustion in some sections of the kiln and excess air in others. Lime is usually drawn very hot with its valuable sensible heat being wasted. Because draft is low, capacity is also low, and in consequence radiation loss is high. Through the combination of all these, fuel economy is very poor.

By contrast, the system here presented in its latest development will produce 50 tons of lime or more if stone is suitable, rather than 15 tons per day or less and this at a fuel consumption of only about 30 gal. per ton, instead of 50. The system is simpler to operate, by "slip" rather than

"hang" method. Lime is drawn at very frequent intervals by automatic means. The new "finishing zone" assures a minimum of core, a minimum of fines and a soft burned active lime. There are possibilities of arrangement for the calcination of "small stone," spalls, which heretofore were either wasted or had to be calcined in the rotary kiln.

#### Oil Gasification Principle

The difference in the oil fired kiln from the producer, natural or blast furnace gas Azbe kilns centers around the special means devised to accomplish oil gasification before its introduction into the voids between the lime particles in the kiln. While the reactions are related, oil, a liquid, demanded a different system than coal, a solid. In case of coal, gasification takes place from a bed of broken solids, while in the case of fuel oil it takes place from suspended globules and from vapors in a flowing hot gaseous stream. In both cases the driving off of volatile matter and gasification of fixed carbon is involved, and in both cases the result is a combustible gas, vapors, and a certain amount of residual carbon.

In either case there must be considerable surface area. A gas producer bed has a rather large amount of coal and coke surface. An atomized liquid

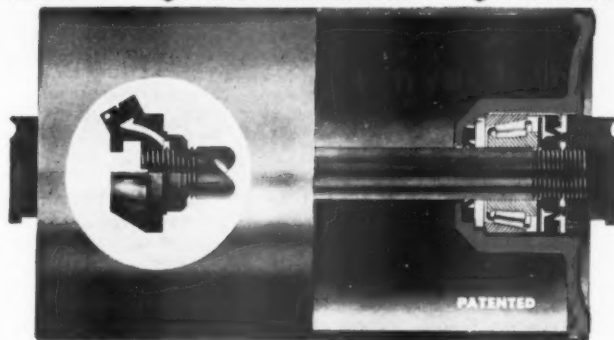
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fuel oil stream has also more or less surface, the amount depending on the fineness of atomization. The heating of the oil occurs at this surface, causing vaporization and an immediate large increase in surface at which gasification does thereon take place.

In the industry's use of fuel oil there may be many varied desires. Complete burning of oil with a short hot flame may be sought, or complete burning with a longer flame may be the goal. An "oil gas" that may be piped and used subsequently may be desired. In the case of the lime kiln it is also desirable to have an "oil gas" but this is of a special kind.

In the usual manner of oil firing, the aim is rapid combustion of the oil, maximum heat generation within a given volume, in a minimum of time, a short flame and complete combustion, none of which is desired in the Azbe system. In this case, the main purpose initially; that is, within the first second or two, is not combustion, or even gasification of oil but rather its vaporization. If we could introduce the oil into the voids between the lumps of lime as a vapor it would be ideal but even through the use of the hot recirculating stream, this is not entirely possible in the case of bunker fuel oils. Vaporization of residues would be slow and incomplete if the recirculating gas temperature only would be relied upon.

There must be some combustion to create a state of speedy vaporization. Simultaneously a state favoring gasification is created. The oxygen for this is present in the recirculating gas in a limited and controlled amount. Initially it is the released hydrogen that burns which brings the gasification chambers up to temperature and vaporization of the larger globules carried in suspension. Thus, vaporization, oxidation of hydrogen and carbon, reduction of  $\text{CO}_2$  to  $\text{CO}$ , cracking of heavier molecules, all take place at the same time.

The gasification chamber in this system is really all of these, a furnace, a gas producer, a distillation, and a cracking unit. It would be an effective furnace if oxygen was not limited and  $\text{CO}_2$  would not predominate in the recirculating gas, but the desire is not to burn the oil but to prepare the oil for the kiln.

The mixture consisting of the residual liquid globules, ungasified oil vapor, gases resulting from oxidation reduction and thermal cracking reactions, and the suspended residual carbon or carbon resulting from the various reactions is then projected by the carrier recirculating gas through the gas ports into the voids between the lumps of lime in the kiln. The aim is that the oil arrives sufficiently dissociated to accomplish distribution but otherwise in the least practical extent. Then, on mixing with the hot air coming up through the lime of the cooler, the resultant flame will be long, mild, and luminous although it also may be made intensive if desired. What

normally is wanted is vapor and heavy molecules rather than  $\text{H}_2$ ,  $\text{CO}$  and the associated intensity of surface combustion, although this latter may also be obtained for sintering operations.

### Operating Principle

Fig. 5 presents the system in its essential elements from which many elaborations are possible. The structure is a lime kiln composed of three zones; the stone preheating zone, the calcining zone, and the cooling zone. The system is dependent for its operation on the recirculating fan which should be of a quality capable of withstanding high temperature.

The gases leave the calcining zone and enter the stone preheating zone at a temperature of about 1650 deg. F. Within the kiln there are suitable ducts through which some of this hot gas is withdrawn by means of the recirculating fan. The composition of this gas at withdrawal point is approximately 35 percent  $\text{CO}_2$  and 65 percent  $\text{N}_2$ .

Into the duct carrying the gases to the fan and very close to the kiln, some air is introduced in a measured amount through an orifice. This air serves a two-fold purpose. It cools the gases to a temperature level practical for the fan, say 1000 deg. F., although special fans may withstand 1300 deg. F. This air also delivers a certain amount of oxygen to the system which serves its purpose of raising of temperatures in the gasifier duct.

This fan thus serves almost the same purpose as the blast fan on a coal or wood gasifying system. It delivers the air to the gasifying system, together with some  $\text{CO}_2$ , which aids the gasifying process and limits the temperatures attained in both gasification and kiln zones which otherwise could readily become excessive and damaging to the structures.

The amount of air admitted to the system is controlled by means of damper "A" from indications of thermometer "B" and flow orifice "C." The amount of gas recirculated is controlled by damper "D" in the main line.

The amount of air introduced into recirculating system is limited, as the aim is to secure as high a temperature of the blast as is practically permissible. There is a further desire that as great a portion of the total air that the system requires for the combustion of oil enters at the base of the kiln. From here the air passes up through the lime cooler, cooling the lime and recovering its sensible heat. Approximately one third of the air will enter at "D" and the remainder will pass through the cooler which is ample for nearly complete cooling of lime if the cooler height is sufficient.

At "E" is the so-called register through which both the hot recirculating gas and the preheated oil enter. Through off-center introduction or by means of vanes the gas is given a rotating flow, entering thus the vapor-

izing chamber "F" with a considerable velocity, the rotating action being important.

Into this vaporizing chamber the oil is injected, finely atomized by the atomizer head "G." The angle of the jet should, as much as possible, be such as to avoid the oil striking the walls. It is for this reason that the vaporizing chamber is enlarged in width and also that the recirculating gas is given a rotating action which tends to deflect the spray from wall impingement.

The temperature of the oil being atomized should be known as well as the oil pressure between the oil regulating valve and atomizer head. In a manner it indicates the amount of oil injected, but since the sprayer plates of the atomizer head tend to carbonize or clog it is not a reliable indication, and only an indicating flow meter can be completely depended upon.

The atomizing pressure should be high, up around 250 p.s.i. The temperature of injecting oil would, on the other hand, be a matter of the viscosity characteristics of the oil. It might vary from atmospheric temperature up to 200 deg. F. By virtue of the fact that the aim is not complete rapid burning of oil with short flame in a minimum of time, but rather the contrary—vaporization, cracking, gasification, and long flame delayed combustion—the necessity for high initial preheat is reduced, particularly as oil is injected into a preheating gas stream of 1000 deg. temperature.

The lower necessary preheat or even no required preheat reduces system operating complexity. It also reduces the bothersome nozzle carbonizing problem. Thus it is conducive to smoother operation.

In the vaporization process the oil must be heated to the boiling point and also the heat of vaporization supplied. Since the boiling point of No. 5 and No. 6 oil is high, not all of it will be vaporized in the vaporizing chamber. This is particularly true of the large globules of the spray which is of a wide range of particle size distribution.

From the vaporizing chamber, the carried stream of air-blended-recirculating gases from the kiln carry the oil vapor and residual liquid globules into the gasifying chamber. Depending on the kiln size as well as on the size of stone calcined, there may be one, two or three gasifying chambers but all connected to the one recirculating fan. There may be only the center gasifier, Fig. 6, or side gasifiers, or the combination of both center and side gasifiers. These are chambers with relatively thin walls but built of high-temperature-resisting refractory material of high conductivity. However, the operation does not aim for high temperatures ordinarily.

The walls of the gasifier are surrounded by hot lime on both sides of

(Continued on page 182)



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# New Developments In Processing Minerals

American Institute of Mining Engineers general meeting in New York City presented some interesting papers covering cement, lime, gypsum, silica, abrasives, fluorspar, and other minerals

THE 176TH GENERAL MEETING of the American Institute of Mining and Metallurgical Engineers was held at the Hotel Statler in New York City, February 15 to 18. All of the several branches and divisions held technical sessions and well over 200 papers were presented.

Of special interest to ROCK PRODUCTS readers were the sessions devoted to industrial minerals and minerals beneficiation, although there were numerous papers in other divisions, such as the Mining Subdivision, which were of particular interest.

In the Industrial Minerals Division there were at least two innovations. The newly created Committee on Industrial Waters presented nine papers in two full sessions. All phases of water problems are of concern to the mineral industries today. Problems of water supply, quality, pumping, stream pollution, and many other phases are, often belatedly, beginning to receive adequate attention.

## Training Men

The second innovation was a session devoted to Careers in Industrial Minerals. This was an experiment to try to bring out papers, general and specialized, on what type of training a man should have to fit him adequately for a successful career in this field. The subject, introduced by Dr. Harold N. Bannerman, was followed by a general paper by Raymond B. Ladoo, who strongly urged the necessity for "generalists" in this age of specialists. Four-year courses in technical schools today usually turn out highly competent specialists who usually are technicians rather than well-rounded engineers. The need for much better preparation in English, both written and spoken, was strongly stressed, as well as better grounding in such basic subjects as mathematics, languages, history, and basic sciences. In the vigorous discussion which followed it was evident that most of the listeners agreed with this viewpoint. One prominent industrialist said, in effect, "Give us men with a strong basic education and we will train them in our own specialized problems." Another engineer said, "I am convinced that we can't make an engineer in four years. It just can't be done. A man needs four years of generalized basic education plus at least two years of advanced or specialized training." F. T. Agthe, in his paper on "Mining Engineering in the Portland Cement Industry," showed that this industry, due to its increasing size and com-

plexity, today needs the services of well-grounded engineers qualified to handle such diversified problems as those of exploration and development of deposits, mining, plant design, and mill operation. Henry Mulryan discussed this problem as it affected the West Coast tale industry. Jack W. Graham's paper has already been noted.

## Cement, Lime and Gypsum

In the Cement, Lime and Gypsum Division, there were four papers, in addition to that by Mr. Agthe mentioned above. O. G. Leliep gave a paper on "Latest Practice of Burning Cement and Lime in Europe." Quoting from the abstract of his paper—"Due to lower wages and much higher fuel prices Europeans are particularly keen in developing and using thermally efficient kilns. Modern shaft kilns are fully mechanized and burn cement of acceptable quality with 700,000 B.t.u. per barrel and lime with 3,200,000 B.t.u. per net ton. Rotary kilns for cement have become thermally very efficient by using exit gas heat for preheating incoming raw material and by recovering heat from outgoing clinker in air-quench type coolers. Dry process Lepol or A.C.L. kiln record shows lowest fuel consumption from 580,000 to 630,000 B.t.u. per bbl., and low dust loss around 1 percent from weight of clinker. Holderbank-Bygi system reaches from 620,000 to 720,000 B.t.u. per bbl., but develops considerable dust. Clinker is burned on sintering machines with around 760,000 B.t.u. per bbl. Calcinator kiln for wet process consumes 1,100,000 B.t.u. per bbl." W. F. Rochow and W. C. Burke gave a paper on "Refractories and Rotary Kiln Efficiencies" in which they reviewed the various available types of refractories and insulations and their importance in maintaining high kiln efficiencies. They also discussed refractory quadrant preheaters and the economies effected by their use. In a paper on "Suspension Preheating of Dry Pulverized Materials," George K. Engelhart described a multi-stage counterflow process, developed in Germany, using preheated rotary kiln waste gases on pulverized portland cement raw materials. This process, now in use at four cement plants in Germany, has been used first in the United States in "a 7- x 125-ft. rotary kiln, at the plant of the Allentown Portland Cement Co., Evansville, Penn. The capacity of this kiln was increased from 860 to 1500 bbl. a day,

with fuel reductions from 1,100,000 B.t.u. to a range between 650,000 and 700,000 B.t.u. a barrel, while using 60 percent of the total waste gas. As full use of the gas stream is approached, additional kiln production and fuel economy is expected."

The use of wet cyclones for classification has become of great importance in mineral dressing. The Lone Star Cement Corp. at South Norfolk, Va., has been studying the application of the Dorrclone and C. C. Van Zandt described results so far obtained. Tests were conducted using a Dorrclone in closed circuit with a 7- x 24-ft. wet, raw tube mill. First tests indicated that the cyclone will substantially reduce plus 50 and plus 100 mesh oversize in the final product, and will give a worthwhile increase in output at 200 mesh as compared to open circuit operation. It appears possible that the reduction in the objectionable plus 50 and plus 100 mesh oversize will permit reducing the minus 200 mesh fineness for kiln feed purposes; however, this point has in no way as yet been confirmed. The normal slurry fineness at this plant is about 90 percent 200 mesh. The use of the Dorrclone has not required or resulted in any increase in the slurry moisture. The only additional power required for the Dorrclone installation consists of a 25-hp. pump motor as compared to the 400-hp. tube mill motor. The solids ground per hour amount to about 13 tons. Tests have not yet progressed far enough to give positive information on all factors and work is being continued.

## Special Sands and Abrasives

In the two sessions on Special Sands and Abrasives, eight papers were presented, of which two were on sand and industrial silica. Thomas D. Murphy, of the U. S. Geological Survey in an excellent paper on "High-Purity Silica Resources of Northeastern United States" summarized the results of extensive field work on the area extending from Pennsylvania and Maryland on the south to the St. Lawrence River and Maine on the north. His work covered all types of natural silica, loose or consolidated, containing 95 percent or more of SiO<sub>2</sub>. Thus he covered high purity sand and sandstone, quartz conglomerate, quartzite, "soft" and "hard" hydrothermal quartz and pegmatite quartz. While there are many deposits of all types now being worked, he found many promising but unworked occurrences which probably could be developed

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commercially. Resources seem to be adequate to local needs, although some special types are brought in from fringe areas. A. D. Bryant delivered a paper on "Natural Abrasive Sands of the Ottawa, Ill., District," written by W. B. Gyger. One new market development was of outstanding interest. This was the use of Ottawa sand in a process for rejuvenating oil wells—wells which have ceased to produce or where production has greatly declined due to clogging of flow channels. This is a patented process owned by the Standard Oil and Gas Co., and operated in the field by the Halliburton Oil Well Cementing Co. Well graded, relatively coarse Ottawa sand is mixed with Napalm jelly or heavy petroleum oil (No. 5 or 6) and pumped down the well under high pressure. This causes a pressure break in the formation, the coarse sand flows into the break and holds the formation open. The process has been very successful in markedly increasing oil flow. Over 25,000 wells were treated in 1953 and its use is still growing. This has created such a demand for the coarsest size fraction of Ottawa sand that orders could not all be filled and size specifications at times had to be broadened.

The remaining papers in this session dealt chiefly with high grade abrasives, natural and synthetic, for coated abrasives and abrasive wheels. Gerald M. Friedman in his paper on emery stated that the only emery now being produced in the United States is the "gray emery" at Peekskill, N.Y. "Gray emery" does not meet the usual definition of emery in that it is a cordierite-sillimanite or occasionally a sillimanite-sapphirine rock. It is tougher than the usual corundum (or spinel) and magnetite "black emery."

The optical industry is not only a large user, but also a principal producer of closely graded abrasives finer than 25 microns. Louis F. Rowe in his paper on "The Hydroclassification of Fine Abrasives" described the methods used, chiefly by centrifugal separation, by which very accurately and closely sized particle fractions are made. Such accurate separations require very close attention to such factors as purity of water, pH of suspensions, and the "protective action" of lyophilic particles in the suspensions. F. Paul Ronca covered "Quality Testing of Abrasives." He described in detail the methods of sampling and testing of abrasive grains used by the Carborundum Co. The principal properties tested are grain size, shape, adhesion, capillarity, and hardness. Shape is controlled by bulk density tests; adhesion by briquette strength; capillarity by wettability; hardness by crushing tests.

### Fluorspar

The great importance of fluorspar in our economy today was evidenced by the eleven papers on all phases of this subject, either presented or available for discussion. There were pa-

pers on world resources, on resources in United States, Mexico, Newfoundland, and Europe, on United States requirements, on geology, on milling, and on phosphate rock as a source of fluorine. Dr. A. H. Sutton, in "Fluorspar Supplies in the United States," reviewed present production and requirements, present and probable imports, and former estimates of reserves. His conclusions as to reserves are as follows—"At the average production rate during the last five years, approximately 600,000 tons of crude ore annually, this estimated supply would be sufficient for 35 years. However, if an emergency made it necessary to meet all of our requirements from domestic production, this period would be shortened. The average annual consumption during the last five years has been 478,000 tons of finished fluorspar, an amount that is equivalent to approximately 956,000 tons of crude ore. Under a production schedule that would meet these requirements, the estimated reserves would be sufficient for only 22 years. Because of new developments in industry, requirements will probably increase." The speaker believes, however, that continued prospecting and exploration will result in the discovery of enough additional fluorspar to enable the United States to be self sufficient for more than the indicated years. In the discussion it was pointed out that the advent of froth flotation made possible the separation of silica from fluorspar which was not previously possible, and this automatically opened up large new fluorspar reserves. Since there are now known no fluorspar ores which cannot be beneficiated by presently used methods, no further extension of our reserves from such an event can be expected. W. P. Hewitt reporting on the "Fluorspar Resources of Mexico" stated that reserves are very large, but in general they are remote from rail transportation. They usually are individually small, but very numerous and, for the most part, are worked by individuals using hand methods.

In the Minerals Beneficiation Division there were 12 papers plus a symposium plus joint sessions with other divisions. In a Materials Handling session, a very interesting paper was presented by G. H. Wilson on "Application of Closed-Circuit T.V. to Conveyor and Mining Operations." Now used by over 200 companies in about 25 different types of industry, television permits of centralized controls, based on observation, of distant and widely scattered operations as well as operations which are too inaccessible or too dangerous to view directly. Cost reductions due to reduced man power requirements often pay for T.V. equipment costs in six months to a year. In addition Industrial T.V. (I.T.V.) reduces accidents and, often, capital investment. O. W. Walvoord discussed "Ore Feeders in Beneficiation Plants" and Messrs. S. D. Michaelson and E. B. Nelson presented a paper on "Bin

Design to Minimize Size Segregation." An eight paper symposium on "What's New in Milling Equipment" covered ball and rod milling, crushing, centrifuging, and froth flotation. Papers on several of these subjects were also presented at a session on crushing and grinding. One interesting paper on "Screen Sizing of Sub-Micron Particles" by R. J. Charles and M. W. First, described new developments in the production of molecular or membrane filters with uniform pore size. Such membranes, tested so far largely on a laboratory basis, show promise as "screens" for testing sub-micron particles.

### Drilling-Mining Problems

In the Mining Sub-Division, there were eight papers in two sessions on Drilling Problems, and four papers on Stratified Mining.

Geophysical and geochemical methods of prospecting have now been successfully extended to some types of industrial mineral deposits, for example, to sand and gravel.

In the Industrial Minerals Division one "catch-all" session covered a diversity of subjects. Dr. Lincoln T. Work and S. R. Mountsier, Jr. gave two allied papers on "Potentials for Progress in Mineral Pigments and Fillers." Dr. Work covered the newest machines and equipment for grinding and sizing minerals in the low micron sizes for fillers and pigments. He emphasized the large and growing demand for such products and the increasingly rigid specifications both on top particle size and on particle size distribution. Mr. Mountsier's paper was devoted largely to the application of such products, particularly in the paint industry.

Due to increasing demand for high grade refractories of the mullite type and to the growing scarcity and high cost of imported kyanite from India, much attention is being given today to United States resources of sources of high alumina. An excellent review of this subject was given by Gilbert H. Espenshade of the U. S. Geological Survey in his paper on "Kyanite, Sillimanite, and Andalusite in the United States." While he reported no large single deposits of high grade material, he noted large reserves of kyanite-quartzite running 10 to 30 percent kyanite in the Southeastern states.

The projected St. Lawrence Waterway with its expected increase in electric power resources have made this area of new interest for industrial growth. This has led New York State and Federal agencies to make detailed studies of raw material resources of the area. One of these studies was summarized by Paul McClintock in a paper on "Sources of Mineral Aggregates from Glacial Drift of the St. Lawrence Valley." Donald R. Irving presented a paper on "The Status of Block Steatite Talc Substitutes" for high grade electrical insulation.

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H-11

# Indiana Producers Anticipate High Volume From Highway-Toll Road Programs

**M**EETING at the Claypool Hotel in Indianapolis, March 15 and 16, the Indiana Mineral Aggregates Association, Inc., annual convention had a record attendance and a well-rounded program. An innovation well-received was a panel discussion of agricultural limestone problems. The banquet speaker was Robert J. Kryter, treasurer of the Esterline-Angus Co. whose talk, "Atoms for Industry" was packed with startling figures on the destructiveness of the atom and hydrogen bombs, but also revealed the more hopeful picture of the atom chained to serve industry, medicine and other fields of use.

## New Officers

Glenn W. Bowen, Hy-Rock Products Co., Marengo, was elected president for the coming year; Geo. Wheeler, Kirkpatrick Gravel Co., Cambridge City, vice-president; M. G. Johnson, The Merom Gravel Co., Indianapolis, secretary-treasurer; and Ralph E. Simpson, Indianapolis, engineer-director. Directors elected include: N. E. Kelb, St. Paul Quarries, Inc.; Max Radcliff, Radcliff & Berry, Inc.; Robt. Connelly, Terre Haute Gravel Co.; Wm. Stonestreet, Stonestreet Gravel Co.; C. A. Broecker, Newton County Stone Co.; H. C. Gorman, Russellville Stone Co., Inc.; M. R. Smith, Montpelier Stone Co., Inc.; Claude Monce, Meshberger Bros. Stone Corp.; J. Henry Law, Western Indiana Gravel Co.; J. A. O'Connor, J. C. O'Connor & Sons, Inc.; and C. C. Irving, Irving Materials, Inc.

President R. W. Siniff presided at the opening session, welcoming all members and guests, and then turned the meeting over to Engineer-Director R. E. Simpson who asked Robt. Koch, executive secretary, National Agricultural Limestone Institute, to review the Washington legislative situation.

Mr. Koch said the primary efforts of the national association had been directed to selling government officials on the need for an adequate conservation program. To give an idea as to the market possibilities, Mr. Koch said that at present about 7,000,000 tons of liming materials were being sold outside the federal aid program as compared with nearly 22,000,000 tons with federal assistance and with estimated annual requirements of 72,000,000 to 80,000,000 tons to bring deficient soils up to essential fertility. He referred to the surveys to farmers made by N.A.L.I. in the states of Maine, New Hampshire, Massachusetts and Connecticut which showed an overwhelming percentage in favor of continuing the conservation pro-

gram and a majority expressing the view that it be increased. Present indications point to a congressional committee recommendation of at least \$250,000,000 and suggestions that it be increased to \$400,000,000. Mr. Koch said that we are wasting our soil resources faster than India and China. Sen. Aitken's bill will extend the life of the A.C.P., he said, and a provision in the bill will permit establishment of going or market prices for agstone in each locality, although it is not mandatory. Mr. Koch said that the states are modifying requirements for soil tests before money may be paid for agstone as it has proved to be a bottle-neck with inadequate testing facilities. Mr. Koch pointed out that the pH test does not measure anything but the CO<sub>2</sub>, or neutralizing effect, and does not give an indication of actual Ca or lime requirement.

The panel discussion on agricultural limestone problems had Glenn W. Bowen, Hy-Rock Products Co. as moderator; Robert M. Koch, Bruce Hardy, and members of the Indiana State A.S.C. Committee; Reed W. Wilson, chairman, Hubert R. Alexander, Clark Baker and Robert Cullen. The discussion revolved around the problem of keeping responsible haulers in business. It developed that it is possible to accept bids which are not the lowest if information is presented that a hauler with a higher bid would be more responsible and capable of delivering the tonnage on which bids were made. In Indiana an allocation of 50 percent for agstone is made. A farmer cannot use less than 2 tons per acre unless a soil test proves it is not needed. Apparently the package deal for a complete program, includ-

ing all fertilizer and seeding, has not worked out. Bruce Hardy suggested use of traveling laboratories to make soil tests.

## Highway Programs

Clarence Windsor, city engineer of Anderson, Ind., in his talk on "Cutting Costs of Street Maintenance" expressed the view that the municipality is not a paving or haulage contractor and this work can be done most economically by private contract. Bids are now taken on a tonnage basis laid down with a big saving to the city, the savings being passed on to the public through more adequate maintenance, street cleaning, etc.

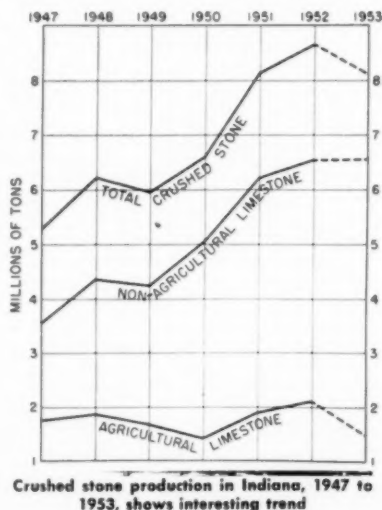
Walter T. Spencer, soils engineer, Indiana State Highway Department, described the joint test program of the highway department with the U. S. Bureau of Public Roads in the construction of a 4-mile test section on U. S. 41. The study, to be made over a period of 10 years, involves investigations of sub-bases of four types under one lane of a two-lane, 24-ft. wide concrete pavement. One mile is constructed with a permeable crushed stone sub-base, a second mile is built with a densely graded crushed stone sub-base, a third mile is laid over a soil-cement sub-base, and the fourth mile is laid directly on the native soil. Up to the present time, tests indicate the pavement with the permeable crushed stone sub-base is giving the most satisfactory results.

Robt. Koch was asked to give the most up-to-date status of percentage depletion in Washington. He said that sand and gravel remains the same at 5 percent, but 15 percent has been granted for all chemical and metallurgical stone regardless of end use, and agricultural limestone has been recognized as chemical grade.

## Mineral Economics of Crushed Stone

John B. Patton, principal geologist, Indiana Department of Conservation, Geological Survey, presented one of the most interesting addresses of the convention, illustrated with slides. Mr. Patton's slides showed that the Indiana limestone industry, with an annual value of \$40,000,000 exceeded the value of oil production, making it the second in the state. The value of sand and gravel exceeds the pre-war value of all minerals except coal.

Referring specifically to the crushed stone industry in the state he said that the trend has been to a smaller number of quarries but the quarries have a higher average productive capacity. During the six years preced-





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ing 1953, agricultural limestone sales have fluctuated, and are currently lower than they were in 1947 while other crushed stone demands have increased. Mr. Patton said that the small roadside quarry is passing, and paradoxically, the so-called super-quarry is also passing from the scene in many areas. The super-quarry he described as the huge rail-shipping quarry that furnished stone for an extensive area along rail networks on which it was located. Truck transportation has revised the outline of the marketing area, he pointed out, and enables a quarry operation to be relatively secure from outside competition within the district in which it has hauling advantages. The super-quarry can exist in a few special areas, particularly where large areas do not have suitable limestone.

Mr. Patton commented briefly on the very small increase in the price of limestone between 1947 and 1952.

Geology has been little used in either the location or the development of quarries, said Mr. Patton, until very recently. By rezoning the working face of a quarry and producing several types of products from different strata, several Indiana quarries, particularly in the Devonian limestones, have solved the problem of meeting specifications. Some quarry operators, he said, had sought geologic advice on means of converting the overburden removal to the profit side of the ledger or at least to reduce the net cost of such removal.

Mr. Patton suggested that quarries add equipment to produce special stone products wherever possible. He pointed out that Indiana had large reserves of high quality chemical dolomite and yet not a ton of it is produced for refractory use or for any other purpose in which its magnesium content is essential. All of it is imported from other states. Only two quarries in the state, he said, produce stone especially for high-calcium purposes. He said that selective ledging and use of the stone are required for the production of a high calcium product. He referred to the Ste. Genevieve limestone in the state which contains large reserves of chemical stone. Mr. Patton pointed out that many operators who will not venture \$50,000 on special facilities to process higher priced products have not hesitated to invest \$250,000 or more in quarries and plants from which they now produce common types of crushed stone.

### Toll Roads

Herman Hartman, pinch-hit for Albert J. Wedeking, executive director, Indiana Toll Road Commission, who could not be present, in presenting an address on "Toll Road Progress." Mr. Hartman said that rapid progress was being made by the 12 contracting engineers, and that it was planned to finish the toll road in 1956.

Harry Essex, a member of the In-

diana Highway Commission, in speaking of the increased cost of highway construction and maintenance said that by 1960, unless additional funds are obtained through a higher gas tax or other source, the highway department would have no funds for construction and it would be entirely on a maintenance basis. Dean Walker, also a member of the commission, said that contracts to be let this year will exceed any past construction season.

## Annual Cement Production

THE BUREAU OF MINES has released its final annual figures on the production and shipment of portland and other hydraulic cements in 1952. Continual heavy demand resulted in a new record output in 1952. Production of portland cement amounted to 249,256,154 bbl., an increase of 1.3 percent over the 246,022,476 bbl. produced in 1951. Production of other hydraulic cements, natural, masonry (natural) and pozzolan (slag-lime), amounted to 3,401,684 bbl. in 1952, a decrease of 1 percent from the 1951 production of 3,449,463 bbl.

Shipments of portland cement in 1952 amounted to 251,368,503 bbl., valued at \$638,512,228, compared with 241,153,272 bbl., valued at \$613,170,483 in 1951. The average value per bbl. in 1952 was \$2.54, the same as for 1951, and compares with \$2.35 in 1950. Shipments of other hydraulic cements in 1952 totaled 3,447,390 bbl., valued at \$9,751,837, compared with 3,475,423 bbl., valued at \$9,832,956 in 1951.

Mill stocks of portland cement on hand December 31, 1952, totaled 15,952,072 bbl., an 11.7 percent decrease from the 18,064,421 bbl. on hand at the end of 1951. Stocks at the end of 1952 were lower in 13 districts and higher in seven districts, compared to those at the end of 1951. Stocks of the other hydraulic cements on hand at the end of 1952 totaled 113,779 bbl., a decrease of 29 percent from the 1951 year-end figure of 159,485 bbl.

Based on the quantities of cement shipped to destinations in the various states, consumption was higher in 1952 in 33 states and lower in 15 states and the District of Columbia than in 1951. States showing the largest percentage gains in apparent consumption were Nevada, Kansas, South Carolina, Arizona, Kentucky, and Oklahoma. Declines were greatest in the District of Columbia, Montana, and Oregon.

The estimated annual capacity of the portland cement industry at the end of 1952 was 284,014,416 bbl., compared to 281,532,328 bbl. at the end of 1951. The percent of capacity utilized in 1952 was 87.8, compared with 87.4 percent in 1951. Percents of capacity utilized in 1952 were higher in 11 districts and lower in nine districts.

Of the types of fuel utilized in the portland cement industry, the quantity of coal consumed in 1952 was 5 percent lower than in 1951, while the quantities of oil and natural gas (including by-product gas) consumed increased 2 percent and 9 percent, respectively, from 1951. Coal was used in the production of 47 percent of the total output of portland cement for 1952.

The percentage of total shipments of portland cement made by rail continued to decline, but accounted for 71 percent of the total 1952 shipments. Truck shipments constituted 27 percent of the total, while the remainder was shipped by boat. Bulk shipments increased from 61 to 63 percent during this period.

The total surplus of 30,085,706 bbl. of cement in producing states was distributed as follows: 27,286,601 bbl. to non-producing states, Alaska, and Hawaii; 2,790,265 bbl. to destinations outside the continental United States (excluding local consumption of Puerto Rican production); and 8840 bbl. to unspecified destinations.

A breakdown of the total production of portland cement, by various types, was listed by the Bureau of Mines as follows:

Type and year	Production (bbl.)	Shipments		
		Bbl.	Value	Average
			Total	
General use and moderate heat (Types I and II):				
1951	207,702,941	203,279,206	\$510,975,002	\$2.51
1952	210,720,294	212,589,258	\$534,252,252	2.51
High-early-strength (Type III):				
1951	7,455,107	7,294,686	21,494,894	2.95
1952	8,014,918	7,982,072	23,377,812	2.93
Low-heat (Type IV):				
1951	900,624	790,819	2,647,460	3.35
1952	252,122	272,062	767,571	2.82
Sulfate-resisting (Type V):				
1951	9,908	87,635	342,689	3.91
1952	99,229	78,276	240,129	3.07
Oil-well:				
1951	1,508,252	1,630,305	4,581,109	2.80
1952	1,841,470	1,787,786	5,099,335	2.85
White:				
1951	1,139,500	1,109,088	5,631,518	5.08
1952	1,081,122	1,094,276	5,900,986	5.39
Portland-pozzolan:				
1951	2,279,023	2,250,280	5,602,288	2.49
1952	1,861,991	1,856,656	4,646,078	2.50
Air-entrained:				
1951	24,201,376	23,885,423	59,247,898	2.48
1952	24,484,689	24,796,917	61,432,052	2.48
*Miscellaneous:				
1951	825,745	825,830	2,647,625	3.21
1952	900,319	911,200	2,796,013	3.07

\*Includes hydroplastic, plastic, and water-proofed cements.



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Left to right: Hollis D. Miller, board member; Wood W. Weaver, vice-president; Gene McClain, board member; Melvin E. Raid, president; and Paul Nauman, board member



Clint A. Allen, executive secretary and treasurer of the Iowa association

## Iowa Agstone Producers Push Sales Program

Legislation, state soil conservation and selling methods discussed at annual meeting of Iowa Agricultural Limestone Association

**T**HE ANNUAL MEETING of the Iowa Agricultural Limestone Association was held in Des Moines, Iowa, March 3 and 4. The first day was devoted to committee meetings and the directors' meeting with the evening reception sponsored by the associate members.

President Ernie H. Matthias opened the convention sessions on the second day with the showing of two moving pictures, presented through the courtesy of the John Deere Co.

Clint A. Allen, executive secretary and treasurer, welcomed the members to the meeting and presented his annual report in which he commented on the growth of the association.

In discussing business, Mr. Allen stated that excellent conditions had prevailed the past two months, but a great need for increased sales promotion to the farmer was indicated. Only about 50 percent of the Iowa farmers, he pointed out, are using agstone, but by pushing a sales program this could be increased at least 25 percent.

The following committee reports were read; Auditing, Nominating, and Resolutions.

### New Officers

New officers for 1954 are: President, Melvin E. Raid, Raid Bros., Denmark; vice-president, Wood Weaver, Weaver Construction Co., Iowa Falls. New members on the board of directors are: Paul Nauman, Dubuque; Hollis D. Miller, Grundy Center; and Gene McClain, Allerton.

Mr. Allen briefly discussed National Agricultural Limestone Institute meeting held in Chicago, February 18, 19, and 20, 1954.

Robert M. Koch, executive secretary of the National Agricultural Limestone Institute, enlarged upon the report of the Chicago meeting. He reviewed efforts of the association in Washington to preserve a sound program for agricultural limestone in

the overall agricultural plans. As a result of association effort, there is a growing interest in the program and appropriations stand a good chance to be increased, but Mr. Koch pointed out that other problems require attention. An example, he said is the question of what is to be done with the 125,000,000 acres that are to be taken out of grain production. These acres should not be allowed to go to waste, he said, because although greater amounts of farm produce are being grown than ever before it is not an indication this will continue.

In closing, Mr. Koch said it might well be a thought to remember that each day 7000 are added to the population in the United States and that which is now in over-supply might be greatly needed, particularly if these acres are allowed to go out of production. Liming, he emphasized is one way to meet the problem.

Program Director for the A. S. C. Committee, State of Iowa, Dewey Cornell, spoke on the topic, "Stabilization of Agriculture Through Conservation." Mr. Cornell talked about farm parity prices. Farmers are being asked to reduce their corn acreage in 1954 by about 20 percent from the average of the past three years, 1951, 1952, and 1953, or 1,934,071 acres, he said. To stabilize agriculture, Mr. Cornell said that these diverted acres should be put into grasses and legumes for which the use of limestone is basic. By using these diverted acres for conserving crops, he continued, the price support program can be maintained at somewhere near the present level, as well as building up a reserve in the soil for the future.

This program is a long-range project, he said, and there is a lot of work that must be done in reaching these objectives. For example, about 3,000,000 tons of limestone per year is being used in Iowa where at least 6,000,000 tons should be used. About

2,000,000 acres need draining. It is necessary, he said, to improve methods, to increase conservation measures to keep agriculture on a stable basis.

Among guests introduced at the luncheon by President Ernie H. Matthias were William S. Beardsley, Governor of Iowa, and E. L. Pavel, manager of the convention bureau, Des Moines Chamber of Commerce.

The association scholarship award was made to Cecil W. Byerly, student agronomist, Iowa State College, who is this year's winner. The luncheon address was by Charles Karsakoff, nationally known humorist, better known to radio listeners as "Stuttering Sam."

Vice-president Melvin E. Raid, presided at the final session, at which Alvin F. Bull, field editor of *Wallaces' Farmer* and Iowa Homestead, spoke on the subject; "Don't Apologize—Sell it." Mr. Bull commented on the need for increased selling effort in a buyers' market, the value of liming for minerals and said that the use of limestone, in his opinion, would continue even without government support.

Dr. Marcus Bach, Professor, in the School of Religion, at the State University of Iowa, spoke on the subject, "The Will to Believe." Dr. Bach's talk was mainly on the subject of some of the inter-religious and intercultural relations.

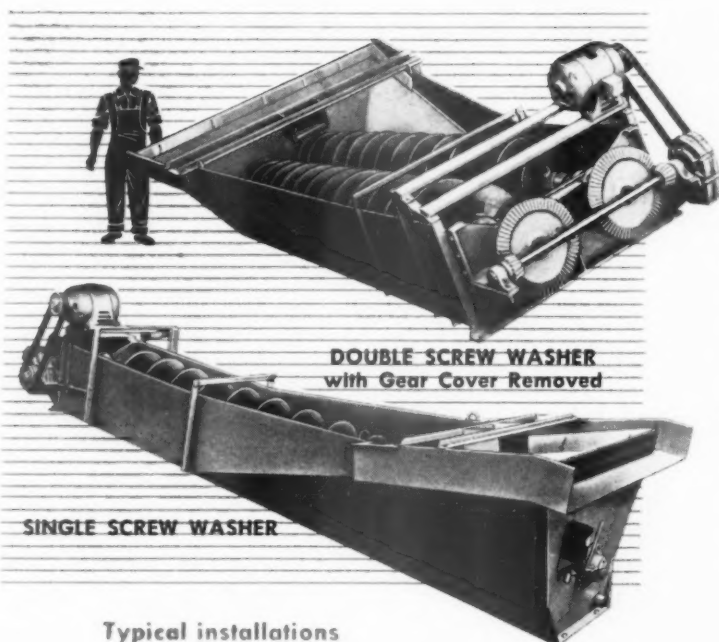
J. W. Reese, supervisor of weights and measures, in the office of the Secretary of Agriculture, State of Iowa, spoke on the subject of "Weights and Measures." Mr. Reese pointed out the importance of controlled accuracy in quarry weighing and how this could be a factor in production costs. He cited some of the rules and regulations that govern the inspection and testing of scales as specified by Iowa State law.

The convention concluded with the evening reception, dinner and ball.

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Hollidaysburg, Pennsylvania

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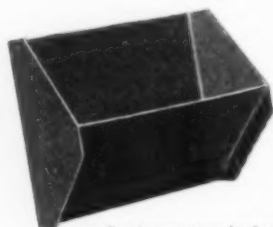
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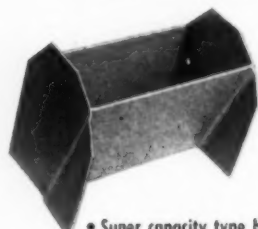
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Write for new catalog showing the complete line of Standard buckets and prices.

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## Agstone Producers' Ideas

(Continued from page 112)

Congress to be certain that our agents there know what our land needs, and it looks like some of the top men in our national farm organizations need an education.

"Our outlook for sales I think is dependent more upon weather than anything else. At this time I believe we are headed into one of the best liming years we ever had provided we receive adequate rainfall at the right time. The mandatory soil testing requirement has not bogged down so far and has resulted in increased per acre tonnages; tonnages much greater I am sure than most County Agents believed necessary. We checked up yesterday and found that our orders to date this year were half again as many as in 1952 and 1953 and over twice as much tonnage. The results of this universal soil testing should do more to impress our congressmen, and our farm leaders and departments than anything done so far.

"I have each year mailed out several thousand prepared advertising leaflets such as offered by our associations and usually one or more letters which I have dreamed up. I have not been able to trace to the little newspaper advertising I have done very much if any results. I recently rented two good-sized signs, one north and the other south of town and so far have no idea what good they are doing. Each Christmas I send my good customers a nice present. We haven't lost many customers.

"If we did not have a soil conservation program with incentive payments I am sure that our business would drop off at least 50 percent the first year and keep slumping down to perhaps 25 percent, unless we started selling agstone for about half price. That's when I go out of business, for there's not enough crushed rock tonnage to support the number of crushing plants now in existence in this area."

Tenn.: "At this time, we are working with our local newspapers in conjunction with the A.C.P. and the county agent to run an advertisement giving the farmers the facts as to the new setup in signing up for agricultural limestone. We expect to follow this up later with more newspaper ads and some radio programs.

"We honestly believe that agricultural limestone sales will be better this year than last year; but to stimulate business, we lowered our price by 10¢ per ton at the plant, and the truckers have lowered their price 10¢ per ton for delivery and spreading within the entire county.

"We have a salesman who tries to attend various farm meetings, and keeps in close touch with the A.C.P. office. We also belong to the local Farm Bureau and try to court the favor of the farmers as a whole.

"I might state that in our particular area, the farmers want the ma-

terial very finely ground, and we are furnishing agstone with 100 percent passing a 10-mesh sieve, whereas the federal specification only calls for 85 percent passing 10 mesh. Other areas do not have this trouble, I am sure, and I would not advise making it any finer than the specification requires, unless there is a demand for it."

Ky.: "About the only feature of promotion for agricultural limestone which might be developed to a great extent to advantage would be to impress the value of liming on the general public, giving them more information as to the improved nutritional values of crops. This has been mentioned in the past and the Department of Agriculture has information on the subject which would certainly be useful as it shows that populations of depleted territories show evidence of malnutrition, inferior bone development, etc., whereas those in properly limed areas have a higher health ratio.

"So far as farmer advertising is concerned, I think that methods at present being used are good, but should be intensified."

Ohio: "We have in this vicinity a very unusual situation. We have considerable farms that are very hilly, and limestone cannot be spread except by hand. Most of the small bottom land along the creeks has been limed very heavily, mainly because it can be done with a truck with a mounted lime spreader.

"The farms all could use a large tonnage of agstone, however, the farmer refuses to spread it by hand from a sled and he will not pay the wages to get it done. If he can get it done at a reasonable or less than reasonable price by a spreader, he will buy what he can get credit on from the government. It is my opinion that he has been spoiled by the allowances he got in World War II and he is not willing to pay out of his own pocket for agstone, even though he knows it will be to his advantage to build up his soil."

Ohio: "I still think the main trouble with the agricultural limestone industry is the fact that there are not enough good salesmen in the business."

Ohio: "Certainly we just haven't found the analysis yet as to how best to sell more agricultural limestone. According to authorities we are no more than half maintaining our mineral balance now and, with an ever increasing population, it seems urgent that something be done in that direction.

"It seems that the consumer should be greatly concerned about the future of the farmer and the farming operation, but it seems that our immediate hope is to encourage farmers to rebuild their soil. Since the money return angle apparently hasn't done the trick we are going more to health and an appeal to the present farmer from the standpoint of providing for those who will follow him."

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**SUPERIOR** primary and secondary gyratory crushers have been making a big name for themselves since they were introduced three years ago. Twenty-six are installed and operating... three are under construction now, including a huge 60 x 109 machine — largest crusher the world has ever known.

A policy of simplifying design and controlling quality has made Allis-Chalmers the leading builder of crushers. A continuing policy of *improving* crusher design has greatly extended this leadership.

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10-S—10 ton



20-S—20 ton



35-SA—35 ton



75-TA—75 ton

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Greater maneuverability, due to shorter wheel bases is a big factor in hauling more tons per hour. Better spring action, front and rear, provides easier riding and adds to truck and tire service life.

These combined features are compelling reasons for seeing your DART Dealer for your truck needs.

51 YEARS OF BUILDING HEAVY DUTY TRUCKS

**DART TRUCKS**  
Kansas City 8, Missouri  
SUBSIDIARY OF THE CARLISLE CORPORATION

## Corrigansville Plant

(Continued from page 90)

1½-in. crusher run. A short inclined belt can return either of these materials back to the secondary reduction units.

The oversize from the screen is sent by chute to a 40-40 Cedarapids impactor driven by two 100-hp. electric motors. Wear on the impactor is not excessive. The throughs from the 40-40 are moved by belt conveyor to a 4- x 12-ft. two-deck vibrating screen mounted over two 40-ton steel truck loading bins. The plus from the top deck flows to a 42-in. x 10-ft. two-deck screen which is likewise mounted over two 40-ton bins. The oversize from the last screen, or any of the material in the four bins can be drawn onto a horizontal running belt conveyor that is a part of the return setup. This flat running belt delivers material to an inclined belt conveyor that returns it either to the impactor, or to a 30-33 C.R. hammermill. The hammermill uses a 125-hp. motor.

The hammermill product falls to its own off-bearing belt conveyor that delivers to a 4- x 12-ft. two-deck screen over two bins, followed by a second vibrating screen (42 in. x 10-ft.), which also is located over two steel bins. The plus fraction from the top deck of the second screen falls to the flat running return belt for re-crushing. In all, nine sizes of crushed stone can be made at one time by this setup.

Ground stored material is reclaimed by an H5G Allis Chalmers front-end loader and a ¾-cu. yd. Koehring shovel. Roy McCulloh is superintendent, and Russell Kaiser is plant foreman.

## Williamson, Penn., Plant

Located about seven miles east of Mercersburg is the Williamson plant of Fry Coal & Stone Co. It is a Cedarapids portable plant, using a 25- x 40-in. primary jaw crusher and a 40-33 closed circuit hammermill. As there are no grate bars in the hammermill, they are using it as an impactor. The flow of material follows:

Koehring Dumpsters unload to a 42-in. x 10-ft. apron feeder serving the primary crusher. The crusher product goes to a 30-in. inclined belt conveyor, 70-ft. centers, serving a 4- x 12-ft. two-deck scalper screen, operated dry. Material from the lower deck is a minus 1-in. product and goes as Pennsylvania 2-A. From the intermediate deck a 1-in. to 1½-in. material is taken which is normally trucked to the dryer for grinding to agricultural limestone. The plus material (1½-in. to 6-in.) goes to the hammermill that is driven by a twin G.M. diesel. A 24-in. inclined belt conveyor, 70 ft. centers, carries the throughs from the hammermill to a 4- x 12-ft. two-deck screen followed by a 42-in. x 10-ft. two-deck screen. Each screen is over two bins. The

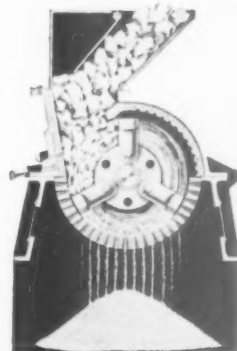
(Continued on page 154)

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For 69 years Gruendler's versatile line of sturdy, dependable Stationary Crushers and Mobile Crushing and Screening Plants have won the preference of Quarry and Sand Plant Operators not only in the United States, but in Europe, Asia, Latin America, every quarter of the Globe.

## For Agricultural Limestone

Gruendler's line of HAMMER-MILLS produces aggregate size stone and agricultural limestone in large volume. Their low maintenance and around the clock dependability is outstanding.



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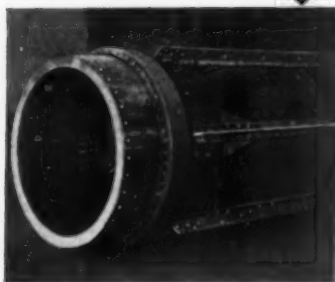
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and washing plants  
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All YUBA screens are cut square to close limits and rolled true to insure proper fit and fast installation. Quick delivery from ARS plate in stock. Competitively priced. Sketches submitted for your approval on request.

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flow diagram gives screen sizes and other details.

This plant is an important producer of agstone, and raw material for this product is trucked to a 5 1/2' x 24-ft. oil fired dryer that prepares the feed for three Bradley, Jr. pulverizers. One of the Bradley mills is driven electrically, and the other two are driven by Buda diesels. Each Bradley is fed by plate feeders and grinding is at one pass with no returns. Mine dust is not produced at this operation.

In the quarry, 4 to 6 ft. of strip-pings are removed to get about 55 ft. of high calcium limestone. Most of the loading is done with a 3/4-cu. yd. Koehring with an older Bucyrus-Erie shovel as a stand-by. Haulage from pit to primary is with three Koehring Dumpsters. The plant has a capacity of 100 t.p.h. Max Rosenderry is quarry superintendent, and William Diehl, plant superintendent.

All shipments from the plant are by truck, and, similar to all the other plants of this organization, truck scales are available. Primary drilling is done with two churn drills, but a Mayhew has been ordered for drilling at this quarry and at the Zullinger quarry.

#### Zullinger Plant

The Zullinger plant is located about a mile west of Waynesboro, Penn. It is a permanent plant and quite old. Agstone production is not important. The primary crusher is an 18' x 30-in. Cedarapids with a 36-in. Tel-smith secondary. A rotary scalper and a 4' x 12-ft. three-deck vibrating screen do the sizing with these units mounted over bins. Reclaiming from ground stored material is by a Hough Pay-loader. The plant has a capacity of about 500 t.p.d. and operates dry. L. K. Bitner is superintendent.

#### Labor Relations Trends

(Continued from page 73)

"A similar case came up this year when the union wanted a mechanic second-class to be promoted from the job of helper. At that time the union representative said that if the promotion was made it would not be necessary to fill the vacancy of the mechanic helper job. The contract clause was to determine how to fill vacancies when they did occur.

#### Findings and Opinion

"The filling of the jobs of electrician first-class and electrician second-class was proper and in accordance with the terms of the agreement by posting and bidding. This question, however, is not before the Board of Arbitration. In promoting the electrician helper from his job to the job of electrician second-class, a vacancy was created in the former job. The union contends that Article IX, Section 9, regarding the filling of vacancies should govern, but it is not directly applicable in the chairman's opinion. The company position that Article XII holds is considered the

most directly applicable in this case. It is management's right to schedule and direct the working forces, including the right to hire, promote or suspend or discharge employees and to lay off employees because of lack of work or other legitimate reasons, provided, however, that the company in the exercise of these rights shall not violate any provision of this agreement.

"If these promotions resulted in the creation of a vacancy in the job of electrician helper, it was a problem for management to decide whether the vacant job required filling at the time. If the electricians first-class and second-class are performing work of the helper at times, they are not suffering any loss in pay for performing a job of lower pay but receiving the higher pay.

"The contention of the union that Mr. Brooks performs work that should be done by the electricians was countered by the company. It was clearly brought out that Mr. Brooks performs work on instruments which work can not be performed by the electricians because none is qualified to perform the work. The contract provides that supervisory personnel shall not perform work ordinarily or regularly performed by employees except for the purpose of training or in cases of emergency when lack of other qualified employees are not available. In this instance qualified employees were not available and the work had to be performed by the supervisor.

"The contract, Article IX, Section 8 reads: 'In the event of reduction of forces plant-wise, seniority shall prevail as follows: In a rollback the senior employees affected shall have preference on any job in the bargaining unit which they are capable of holding but not above their classification at the time; except, if a senior employee is forced off the payroll completely such employee shall be allowed to roll an employee younger in seniority, whose job he is qualified to hold.'

"This clearly defines the method to be used in reduction of forces, and the company should not use any other method of reducing forces for the purpose of circumventing this section of the agreement between the parties. The company had the right to schedule and direct working forces, and it is its right exclusively to decide what the working force shall be. If the company promoted an employee which caused the employee's former position to be vacant, it is not for the union to determine that this position needs to be filled, but such decision rests with management alone.

"The agreement provides under Article XVI, Section 2: 'Supervisory or professional personnel shall not perform work ordinarily or regularly performed by employees except for the purpose of training or instructing, or in cases of emergencies when regular or other qualified employees are not available, or to safeguard employees,

# Shaves time from every working cycle



## Le Roi Transo TLF-150 Front-end Loader

**YOU** move more material—faster—at lower cost — with this Le Roi Transo 1½-yard Front-End Loader. It saves you money every minute it's working — and here's why:

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Patented "bucket-rocking action" helps you get a full bucket load within seconds, without tire-spin or undue strain on the loader.

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Four-wheel drive and low center of gravity provide powerful traction. Torque converter transmits power fast and efficiently. You get in and out in a hurry — in sand, mud, snow, or rocky terrain. Planetary-type reversing transmission cuts reversing time 95%.

You can maneuver the TLF-150 easier and in less space, thanks to power steering, short (84") wheelbase, short over-all length, and small turning radius. Low carrying position of bucket gives operator especially good vision and provides an extra margin of safety.

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14-foot maximum dumping height and 3-foot reach let you spot loads quickly with pin-point accuracy over high truck tail-gates, bins, hoppers.

Now, don't just take our word for all this. See a Le Roi Transo TLF-150 in action, see how it makes shorter work of your material-handling jobs—how it cuts time and costs. Have your nearby Le Roi distributor arrange a demonstration.

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- (a) Dust laden air is drawn in from the dust sources as indicated by the shaded arrows.
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or where plant production is seriously affected.

"This apparently was not violated inasmuch as the work done by the chief electrician, whose job is supervisory, was emergency work on one occasion, and no other men in the plant are qualified to work on instruments. The contract permits supervisory personnel to perform work when other qualified employees are not available, and such were the circumstances under which the chief electrician worked at other times.

"Article IX, Section 9 of the agreement between the parties provides for the method of selecting an employee for a vacant position. It does not however, state that a vacated position must be filled, whether the performance of the job is necessary or not. Article XII of the contract provides: 'Management: The company shall have the right to manage the plant, schedule and direct the working forces, including the right to plan, direct, control plant production and operating methods; to hire, promote, demote or suspend or discharge employees, and to lay off employees because of lack of work or other legitimate reasons, provided, however, that the company in the exercise of these rights shall not violate any provision of this agreement, nor any right which the union may have because of any federal or state laws.'

"This gives the management the right to control production and operating methods. Management, therefore, has the right to determine when a helper is needed and when not.

"The union contends that the chief electrician should not do work that should be assigned to the electricians. If this contention of the union were sustained, the company would have been in violation of the agreement. Such practice would cause the job of chief electrician to be in the bargaining unit, or he should be prevented from doing work normally assigned to electricians. It is apparent that the work done by the chief electrician was either emergency work, or work that could not be done by the other electricians. Therefore, the position of the union is not sustained.

"The chairman of the board of arbitration finds no substantial support to the contentions of the union on the issues in this case, and the recommendation will be that this grievance be dismissed."

## To Increase Capital Stock

HERCULES CEMENT CORP., Philadelphia, Penn., has asked its shareholders to approve an increase in authorized capital stock to 300,000 shares of \$10 par value, from the present 180,000 of \$10 par value common stock. The company currently has 160,973 shares of stock outstanding. Of 19,027 shares held in the treasury, 7950 reportedly are held subject to option agreements, covering sale of the stock.



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### TORQUE CONVERTER DRIVE

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**GREATER OUTPUT** — Machine operates at highest speed in relation to load

New standards of tractor-shovel performance are being set by the famous 1½ yd. Model HM "PAYLOADER" because a NEW Torque Converter drive has been added to its many features. A year of extensive field-testing proves that this new development insures faster, lower-cost materials handling because output is increased up to 1/3 and maintenance is drastically reduced.

Combined with the 4-speed, full-reversing transmission, the Torque Converter provides an unlimited range of automatically selected speeds to meet the load and operating conditions. Parts breakage and maintenance are less because shock loads are absorbed.

Prove to yourself that this pioneer four-wheel-drive tractor-shovel, with torque converter, is the finest tractor-shovel available. Ask your "PAYLOADER" Distributor for a demonstration, or write The Frank G. Hough Co., 705 Sunnyside Ave., Libertyville, Illinois.

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full details on the big 1½ yd. Model HM, or on any of the six smaller "PAYLOADERS" — 1½ yd., 1 yd., ¾ yd., ½ yd., or 12 cu. ft. sizes.



4-wheel, multi-disc air brakes, with 2822 sq. in. of braking surface, give operator confidence to doze fast close to edge of the bank. 186 hp Tournatractor has plenty of power to push limestone fragments weighing over 3 tons. Limestone layer here is 51 ft. deep.



## Rubber-tired tractor replaces 2 crawlers in 150-acre quarry

*The Wagner Quarries Co., Sandusky, one of Ohio's largest limestone dealers, ships about 7,000 tons of agricultural lime, concrete aggregate, railroad ballast and rip-rap daily.*

Until about two years ago, their scattered dozing jobs were handled by 2 crawler-tractors. Maintenance on these crawlers was high because the rough quarry floor caused constant track damage. Then, Wagner Quarries brought in a rubber-tired Tournatractor.

### 98% efficient over 2000 hours

Working year-round, under the same conditions as the crawlers, it has shown 98% mechanical efficiency. There have been no tire troubles, and with more than 2000 hours on its hour-meter, Tournatractor still is running on original tires. According to W. J. Sprow, Jr., Vice President and General Manager, it is much cheaper and faster to run on rubber than on tracks.

"Our Tournatractor has now replaced the 2 crawlers," says Mr. Sprow. "It's very economical to use, and we've had no major difficulties. To sum it up, performance is high, and maintenance is low. It is the best tractor we have ever had."

### All-purpose tool

Besides being cheaper and faster to run, Tournatractor

has proved more versatile, too. Equipped with 3-yd. Angledozer blade, the 186 hp unit cleans up after blasting, so that quarry floor is kept smooth for hauling units. It has plenty of power to handle limestone fragments weighing 3 tons and more. In spare time, Tournatractor strips 3 to 5' of black topsoil for enlargement of the 150-acre quarry. It also tows equipment, often working on grades of 20%. Moving stockpiled limestone, it economically dozes as far as 300 ft. one-way. "Indispensable" say the owners... handles jobs crawlers "couldn't touch."

Tournatractor beats crawlers, because it can work and go anywhere *fast*... over pavement, across tracks, at speeds to 19 mph. If you are looking for increased production and lower maintenance, it will pay you to investigate Tournatractor *before you buy another set of tracks*. Your LeTourneau-Westinghouse Distributor will gladly arrange a demonstration of Tournatractor on *your* property.

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Its ability to take it and carry on has established Naylor light-weight pipe as a star performer in mining service. The extra collapse strength provided by Naylor's exclusive lockseam-spiralwelded structure plus ease of handling and installation have earned top billing for Naylor in high and low pressure air and water service. If this is the kind of performance you need, write for Naylor Bulletin No. 507 to get the complete story.

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## Rocky's Notes

(Continued from page 71)

concrete in sea water. He also discovered that a mixture of "fat" lime and lightly calcined magnesia had hydraulic cementing properties.

The first textbook on the manufacture of portland cement appears to have been one published in 1868. The author was a British civil engineer, Henry Reid. His book also contained a translation of a German text by M. A. Lipowitz on a new method recently adopted for manufacture of portland cement in Germany. At this time, according to the author, English engineers and architects were just beginning to look with confidence on portland cement; hitherto they had favored hydraulic limes and Roman cements, which were in the nature of mixtures of lime and pozzolans. England had already built up a sizable export business in portland cement; and Germany was one of her best customers. These English cements were made in shaft kilns, or in brick ovens very similar to those used for burning clay products. The raw materials were chalk or marl and clay, which were mixed together, formed into bricks, dried and calcined. There was not much magnesia in these materials, and no limits were considered, since it was assumed the magnesia served the same purpose as the lime.

The first quality requirement demanded by users of early English portland cements appears to have been for a cement of greater weight per cubic foot, or a higher apparent specific gravity than that of Roman cements. For example Reid quotes engineering authorities to the effect that a weight per bushel of at least 120 lb. was desirable, and that tensile strength of neat cement specimens was proportional to the heaviness of the cement. An English bushel is 1.2837 cu. ft., so a weight of 120 lb. per bu. is about 93½ lb. per cu. ft.; or these "good" old English portland cements were probably very much like our present-day portlands in composition. They were not, of course, so "hard-burned," although they were considered hard-burned for that day; and they were far more coarsely ground. Incidentally, Reid's book is interesting as suggesting the use of portland cement concrete for practically every purpose we know of today.

Apparently, when the Germans started making their own portland cements, they ran into difficulties from appreciable percentages of magnesia. It was known to the English manufacturers that hard-burned, uncombined lime, hydrated slowly and caused unsoundness. But this difficulty was overcome by "seasoning" the cement clinker and the ground cement, which gave this free lime an opportunity to "air-slake." The uncombined magnesia apparently did not air-slake under the same conditions, and if the cement was to be

burned at the temperatures required to make good portland cement, the magnesia had to be limited to small amounts. There never was any secret, however, as to why natural cements high in magnesia were good while portland cements with only about one-quarter as much were bad. Manufacturers of the natural cements knew that to make a high magnesia cement the burning process must be of long duration and at relatively moderate temperatures (usually described as cherry-red heat). These are conditions difficult to be attained when calcining came to be done in rotary kilns.

Gen. Q. A. Gillmore, in his "Practical Treatise on Limes, Hydraulic Cements and Mortars," published originally in 1872, based on experience acquired prior to 1863, wrote: "While we are not prepared to say that the double carbonate of lime and magnesia, called dolomite, containing a single equivalent of each of the bases, although eminently hydraulic, could, in practice, be relied upon for hydraulic mortars, even in localities where the supply is sufficiently abundant for such a purpose, yet it is certain, that magnesium limestones, especially those which contain clay, do furnish good cements, and that the Rosendale brands, our chief and best reliance in the United States, are derived from this class."

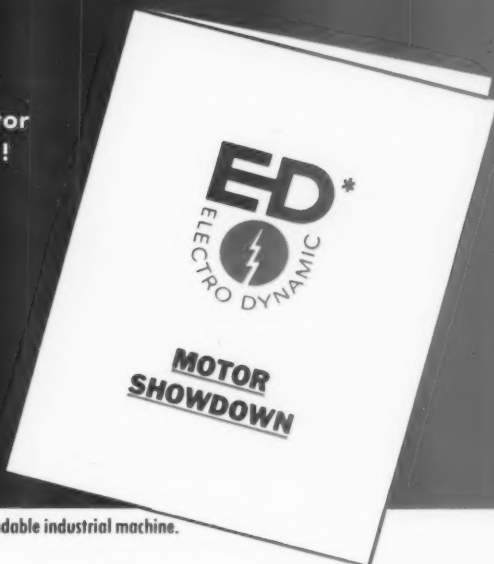
Early in the manufacture of portland cement in the United States, the Geological Survey of Ohio published (in 1904) a bulletin on "The Manufacture of Hydraulic Cements," by A. V. Bleining, in which the following appears: "Golinelli in 1895 reported a carefully arranged series of tests with magnesium portland cements containing an average of 26 percent of magnesium oxide and corresponding to the ratio  $\frac{CaO + MgO}{SiO_2 + Al_2O_3 + Fe_2O_3} = 2.06$ . The silica-alumina ratio maintained was 3.0. These cements possessed most excellent strength and were entirely constant in volume. This investigator came to the conclusion that magnesia may be substituted for lime." The author of this bulletin concluded that the trouble with magnesia in ordinary portland cements was caused by the differences in the time, temperature of calcination and rates of hydration between lime and magnesia. In other words it is the delayed hydration of the magnesia that is the cause of trouble, but there is no suggestion that the magnesia is not as good as lime in forming cement. This delayed hydration as a cause of trouble was "discovered" many years later at the Bureau of Standards.

#### Needed Research

Plenty of proof exists that good (even very exceptional) hydraulic cements can be made with limestones containing 15 to 25 percent of magnesium oxide, but obviously not by modern lime or portland cement manufacturing techniques. Also, there are

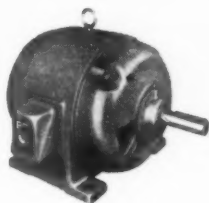
(Continued on page 166)

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# INFORMATION

## TO HELP YOU MEET TODAY'S PROBLEMS AND TO MAKE PLANS FOR TOMORROW

You can obtain catalogs listed on these pages by merely checking and mailing the coupon below

- 1 **ADJUSTABLE LOADING RAMPS**—Rowe Methods Inc. has issued a brochure describing its line of hydraulic adjustable loading ramps. Design and construction features, engineering diagrams and application data are given.
- 2 **ASBESTOS DUST CONTROL**—American Wheelabrator & Equipment Corp. has published Bulletin 412 describing and illustrating Dustube cloth-tube-type dust collectors for the asbestos industry.
- 3 **BELT CONVEYORS**—Barber-Greene Co. has announced an 80-page erection and operation manual on "Redi-Fab" belt conveyors. Illustrations are utilized to show every phase including selection and preparation of the site, pier loading tables and construction suggestions. Truss, carriers, terminals, and accessories are illustrated with visual instructions covering the initial assembly and installation of the component in the conveyor set-up. Other sections cover lubrication and maintenance.
- 4 **BLOCK CURING**—Prat-Daniel Corp., Thermobloc Div., has brought out a folder describing and illustrating the Thermobloc oil-fired heater for curing concrete block. Tables are given, and drawings show recommended locations for the unit.
- 5 **CAR UNLOADER**—National Conveyor & Supply Co. has issued a bulletin describing and illustrating the National Car Shaker for unloading hopper bottom cars. Three basic types of installation are given.
- 6 **CENTRALIZED LUBRICATION**—The Farval Corp. has brought out a booklet entitled "Studies in Centralized Lubrication 1954," describing and illustrating typical applications of its centralized lubrication systems.
- 7 **CHAIN**—Chain Belt Co. has released Bulletin 53-56 describing Rex Z-Metal chain and user benefits. Typical application photographs and a pictorial presentation of available chain is included. Also given is a table showing relative corrosion resistance from laboratory determinations.
- 8 **CLINKER COOLERS**—Allis-Chalmers Manufacturing Co. has released Bulletin 07B-7869, describing Air-Quenching shaking grate coolers for use in the cement, lime and chemical industries. Design features, and installation and maintenance data are included.
- 9 **COMPRESSOR VALVE**—Pennsylvania Pump & Compressor Co. has released Bulletin 509-D describing and illustrating the Airchek valve for air and gas compressors. A cross-section of the valve is shown and testimonial letters are given.
- 10 **CONVEYOR BELT REPAIR**—The B. F. Goodrich Co. has published a 32-page, illustrated manual telling how to splice and repair conveyor and elevator belting. Splicing materials, tools needed, the best conditions for splicing and repair, the method of splicing cord and fabric belts and special procedures in splicing rayon belts are described. The use of "Quick-Lock" temporary repair material is also described.
- 11 **CRAWLER-TRACTORS**—American Tractor Corp. has released a catalog entitled, "Terratracs And Their Equipment," describing and illustrating the Terratrac line of crawler tractors, including specifications.
- 12 **DOZER BLADE**—Shunk Manufacturing Co. has brought out a bulletin announcing the Rhino blade for bulldozers and scrapers, featuring a special alloy steel cutting edge.
- 13 **DRAGLINE BUCKET**—Page Engineering Co. has issued Catalog RL-154 describing and illustrating the "RL" Class lightweight automatic dragline bucket. Specifications are included.
- 14 **EARTHMOVING EQUIPMENT MAINTENANCE**—Caterpillar Tractor Co. has released Form No. D411, a cartoon-style maintenance guide for earthmoving equipment, including bulldozers, cable and hydraulic controls, pipe layers, rippers, scrapers, shovels and wagons. Adjustment and lubrication details are also explained.
- 15 **ELECTRIC HOISTS**—Coffing Hoist Co. has announced Bulletin QL on 17 Quik-Lift hoists from 500 to 4000-lb. capacities. Performance and safety features, cut-away drawings showing construction details, specifications and dimensions, and illustrations and descriptions of various electric hoist accessories are included.
- 16 **ELECTRIC OIL HEATERS**—Hauck Manufacturing Co. has issued Catalog 709A giving capacity ratings of electric oil heaters for sizes from 2 up to and including 64 kw. Operation data, oil heating rates and advantages are also given.
- 17 **ELEVATOR BELTING**—The B. F. Goodrich Co. has published a 24-page illustrated engineering handbook describing the types of belt bucket elevators, giving factors for belt selection, and outlining procedures for engineering the correct belt. Belt construction features are also given.
- 18 **EMERGENCY LIGHTING EQUIPMENT**—The Electric Storage Battery Co., Exide Industrial Div., has announced Form 4808 giving schematic drawings, layouts, illustrations and descriptions of auxiliary emergency lighting equipment. Lightguard Models M and T are featured, and installation procedures are given.
- 19 **EXPLOSIVES — SPANISH TRANSLATION**—Atlas Powder Co., Explosives Dept., has brought out a 48-page book and catalogue entitled "Explosivos y Productos Atlas," printed in Spanish, giving aid in the selection of industrial explosives for underground and strip mining, quarrying and construction, seismic prospecting, pipelining, etc. The properties of various types of explosives and blasting equipment are described and tabulated, and a section is included on millisecond delay blasting.
- 20 **EXTERNAL VIBRATORS**—Viber Co. has published a 10-page booklet telling how to apply, operate and maintain external vibrators in the manufacture of concrete pipe. Vibrator design and construction details are given, as well as specifications, and maintenance and operation data.
- 21 **FIRST AID**—E. D. Bullard Co. has prepared a catalog containing information and photographs of 16 types and styles of "Safety Green" first aid kits including the fire department and pocket kits. A page is devoted to 60 different unit first aid packs.
- 22 **FORK LIFT TRUCKS**—Gerlinger Carrier Co. has brought out a 24-page, full-color catalog on its fork lift trucks. Photographs, specifications and attachment descriptions are included.
- 23 **FORK TRUCK**—Berrett-Cravens Co., Crescent Truck Div., has announced a 16-page bulletin describing and illustrating the Palletier fork truck. Specifications and dimensional drawings are given on the eight models.
- 24 **FORK TRUCK**—The Elwell-Parker Electric Co. has released a folder describing and illustrating the Model F-39T10 electric powered 10,000-lb. capacity fork truck. Engineering drawings, detailed views of components, application photographs, specifications, and operating and construction features are included.
- 25 **FRONT END LOADER**—Le Roi Co. has published a bulletin describing and illustrating the Transo 1½-cu. yd. front end loader. Design and safety features, and specifications are included.
- 26 **GYRATORY CRUSHER**—Allis-Chalmers Manufacturing Co. has announced Bulletin 07B-7870, describing the engineering features of "Superior" primary and secondary gyratory crushers. Included are a performance table, product selection curve, a formula for determining horsepower requirements, table of average work index values according to types of materials, and dimension tables.

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- 27 **GAS DRIVE WELDER**—Hobart Brothers Co. has released a 48-page booklet, No. EW-183, entitled "How To Build Your Own Gas Drive Welder," giving a progressive step by step plan, showing photographs, plans and ideas for building a portable gas drive arc welder.
- 28 **HARD FACING**—Stoody Co. has published Vol. 15, No. 5 of "Fusion Facts," describing and illustrating the use of Magnecote alloy flux in semi-automatic welding operations. Illustrations and descriptions of other typical hard-facing applications are also included.
- 29 **INDUSTRIAL PLASTICS**—Joseph T. Ryerson & Son, Inc., Ryertex Plastics Div., has published a 16-page illustrated bulletin describing the development, production, and performance records of Ryertex industrial plastics including laminated plastic sheets, tubes, rods, etc.
- 30 **JAW CRUSHER**—Traylor Engineering and Manufacturing Co. has issued Bulletin 1124 describing and illustrating the Type M jaw crusher. Construction details are given as well as capacities and power requirements.
- 31 **KILNS-DRYERS-COOLERS**—W. P. Heinen, Inc. has announced a bulletin on rotary kilns, dryers, coolers and dust collectors. Typical application photographs are included.
- 32 **LABORATORY PLANNING**—Scientific Apparatus Makers Association, Laboratory Equipment Section, has brought out a revised edition of "Better Laboratory Planning," giving a comprehensive approach to laboratory planning. Typical lab photographs and layouts are given, as well as a section on recommended bidding practices.
- 33 **LUBRICATION**—Swan-Finch Oil Corp. has released a "Lubrication Guide" describing the uses of Motul lubrication for tractors, trucks, farm and road equipment, etc. Diagrams and cutaway drawings illustrate performance characteristics.
- 34 **LUBRICATION**—The Texas Co. has released Vol. 40, No. 3 of its technical publication, "Lubrication." Filters and purifiers for oil circulating systems are featured.
- 35 **MASONRY WATERPROOFING**—Prufcoat Laboratories, Inc. has prepared an eight-page brochure describing the methods of waterproofing and decorating masonry surfaces. Descriptions and illustrations are given of Prufcite light-fast color, heavy-duty clear, and silicone formulations. Application, surface preparation and specification data are included.
- 36 **MIXERS AND AGITATORS**—Le Roi Co. has brought out Bulletin TM-5 describing and illustrating the Transo line of mixers ranging in size from 3 to 6½ cu. yd. Specifications and dimensions are given along with information on capacities, water systems, power units, and weights.
- 37 **MOTOR GRADER**—Allis-Chalmers Manufacturing Co., Tractor Div., has published a 25-page catalog covering the mechanical features and specifications of its Model D motor grader. Job-application photographs, cut-away views of the unit and the engine, and mechanical and construction features are given. Illustrations and data on optional equipment is also included.
- 38 **OPERATORS**—Minneapolis-Honeywell Regulator Co., Industrial Div., has released Bulletin 414-1 describing its line of "Air-O-Motor" spring and springless type operators. Schematic diagrams, tables, photographs and accessory data are given.
- 39 **PIPE AND FITTINGS**—Naylor Pipe Co. has brought out Bulletin 507 showing typical applications of its lightweight, lockseam-spiral-weld pipe and fittings. Standard specifications and data on fabricated fittings, flanges, and connections are included.
- 40 **PIPING AND PRESSURE VESSELS**—Taylor Forge & Pipe Works, has brought out the second issue of its house organ "Taylor Forge," describing and illustrating its piping and pressure vessels, giving pressure-temperature ratings, and flexibility and stress intensification factors. A review of recent literature and standards is also given.
- 41 **PRESSURE VESSEL DOORS**—Blaw-Knox Co. has announced Bulletin 2435, entitled "Quick Opening Doors for Pressure Vessels." Photographs and descriptions are given.
- 42 **RAILROAD TRACK SCALES**—The Howe Scale Co. has released Form 685, describing and illustrating the line of heavy-duty four-section straight lever railroad track scales for weighing carload shipments. Weight indicating equipment for the scales are featured, and specifications are given.
- 43 **RESPIRATOR**—Mine Safety Appliances Co. has published Bulletin 1007-4 describing and illustrating the Comfo chemical cartridge respirator for protection against toxic dusts and organic vapors. Replacement parts are also listed.
- 44 **RUBBER HOSE AND BELTING**—Carlisle Rubber Co. has issued a 24-page catalog describing and illustrating various types of industrial rubber hose and belting. Specifications are also given.
- 45 **SCREENING**—Universal Vibrating Screen Co. has released Catalog No. 150 describing its screening equipment.
- 46 **SERVICE FACILITIES**—Caterpillar Tractor Co. has released form No. D410 entitled "Your Job, Your Equipment and Caterpillar Service." Shop and field services and facilities are described and illustrated.
- 47 **STEEL FORMS**—Blaw-Knox Co. has released a 50-page bulletin, No. 2430, describing a wide variety of steel forms for concrete construction. Over 50 photographs illustrate the range of application. Design suggestions are included.
- 48 **TRACTORS**—Allis-Chalmers Manufacturing Co., Tractor Div., has brought out a 36-page catalog entitled, "Presenting the Allis-Chalmers Line," describing and illustrating its crawler tractors, wheel tractors, motor graders, scrapers, wagons, etc. Data on the HD-15 crawler tractor is also included.
- 49 **TRANSIT MIXERS**—The White Motor Co. has released folder No. SP-543, entitled "Facts That Will Increase Operating Efficiency in the Transportation of Ready-Mix Concrete," describing the line of six-wheel transit mixer units.
- 50 **V-BELT DRIVES**—Allis-Chalmers Manufacturing Co. has issued Bulletin 20B6956B entitled, "Guide for Figuring 'Texrope' Drives," giving the methods for calculating horsepower capacity of its V-belt drives. Tables are used throughout.
- 51 **VALVES**—Minneapolis-Honeywell Regulator Co., Industrial Div., has issued specification sheet 410-2, describing Series 800 diaphragm motor valves with Saunders bodies, the pinchcock design for tight shutoff of slurries. Details and features are included.
- 52 **WASHING-CLASSIFYING EQUIPMENT**—Eagle Iron Works describes and illustrates its washing, classifying, and dehydrating equipment in a 40-page catalog, No. 54. Specifications, installation and operation details, and equipment diagrams are given.
- 53 **WATERPROOFING**—Pioneer Latex and Chemical Co. has announced a bulletin describing Sta-Crete, a heavy-duty waterproofing compound for basements and cellars. Before and after photographs are included.
- 54 **WATER-REPELLENT COMPOUNDS**—Dewey and Almy Chemical Co., Construction Specialties Div., has published a technical brochure describing the theory, applications and benefits of special silicone resin water-repellent compounds for above-grade exterior masonry. Comparative ratings and job specifications are included.

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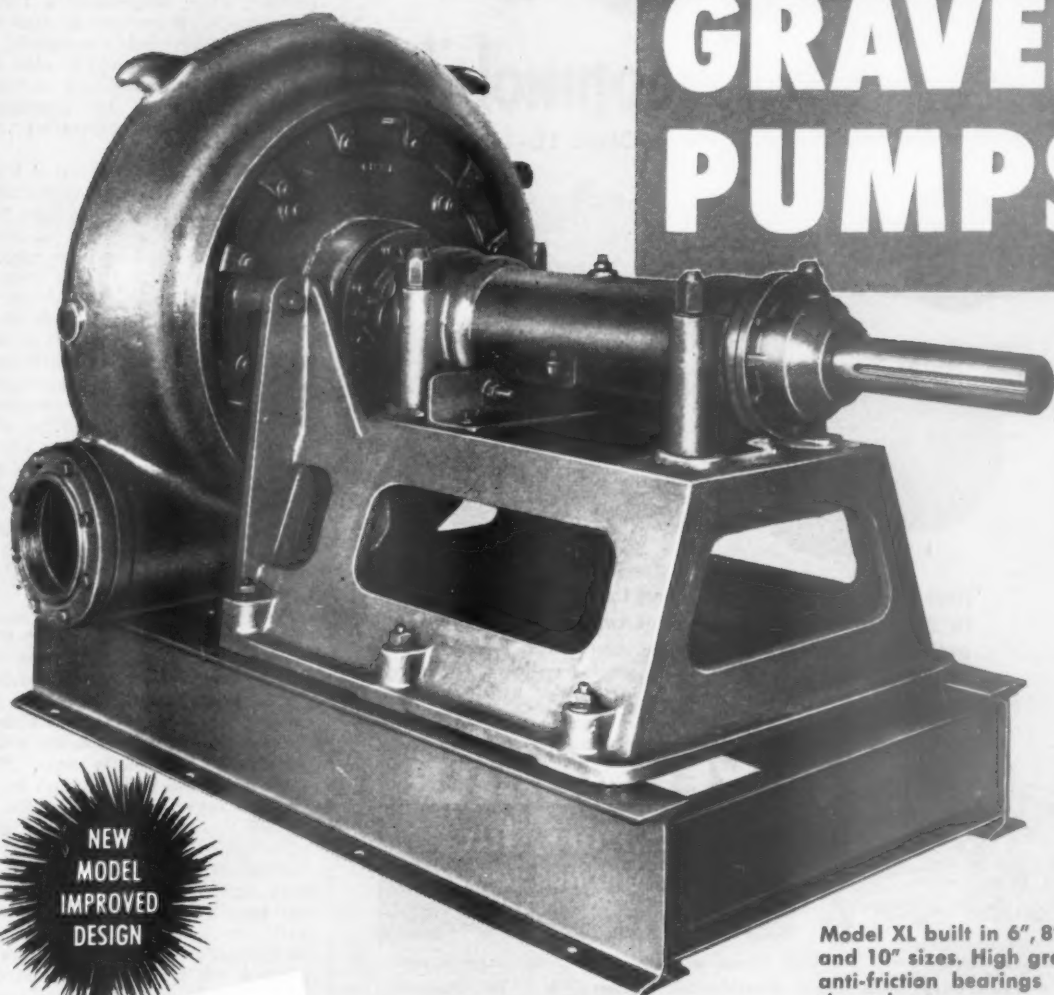
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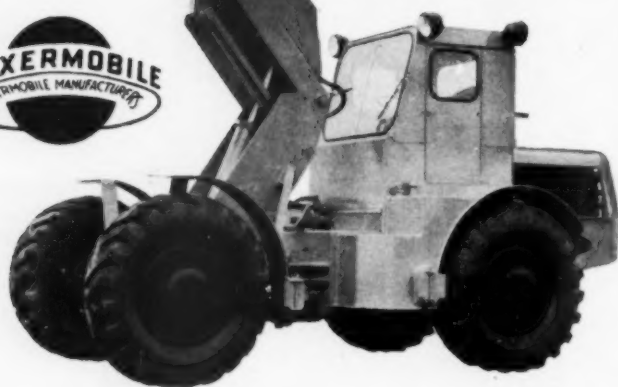
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## Rocky's Notes

(Continued from page 161)

some facts derived from modern structural chemistry to suggest that magnesium silicates have definitely more desirable structures as regards toughness and durability than have calcium silicates. Obviously, there is here an opportunity for some original research to find out what the reaction products of MgO and SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub> are at ordinary room temperatures. The experiments could perhaps be done with dolomitic lime, but apparently the simplest approach would be with MgO only. Some authors believe that magnesium substitutes for alumina in forming hydraulic cementing compounds.

Another thing to find out is whether or not the paragraph quoted above, by Capt. Smith, has a scientific foundation. In other words, it would appear that a cement high in magnesia would be at its best if it were designed *never to be completely hydrated*. The "ancients" inadvertently accomplished this purpose in many instances apparently by coarse grinding the cement and making concrete of relatively dry mixes, rammed to perfection. In general building structures, architects whose previous experience was with lime mortars probably designed their buildings to avoid excessive exposure of mortar joints to continuously wet or saturated conditions. Moreover in those days it was standard practice to "retemper" mortar before use.

It is reported to us that samples of mortar from the Brooklyn Bridge piers, which has proved entirely satisfactory under tough service conditions for 80 years, subjected to the autoclave tests now being demanded of present-day mortar cements will fail miserably. Apparently some of the MgO never did hydrate, and in place perhaps never will, because the mortar or the individual cement grains have sealed themselves against further absorption of water. Hence, it does not require too much insight to see that either something is wrong with the present autoclave test, or something is wrong with our present method of manufacture and/or of manipulation of high-magnesia cement mortars and concrete.

## Calaveras Cement

CEMENT SHIPMENTS of Calaveras Cement Co., San Francisco, Calif., were 44 percent higher in 1953 than in 1952, as recently reported by William Wallace Mein, Jr., president. Announcement was also made of the board of directors' acceptance of the resignation of H. C. Maginn, executive vice-president, who recently resigned to assume the presidency of Blair Holdings Corp., and of the appointment of vice-presidents Arnold M. Ross, Mel J. London, and E. M. Barker to the company's management committee, with Gardner W. Mein named as alternate member of the committee.



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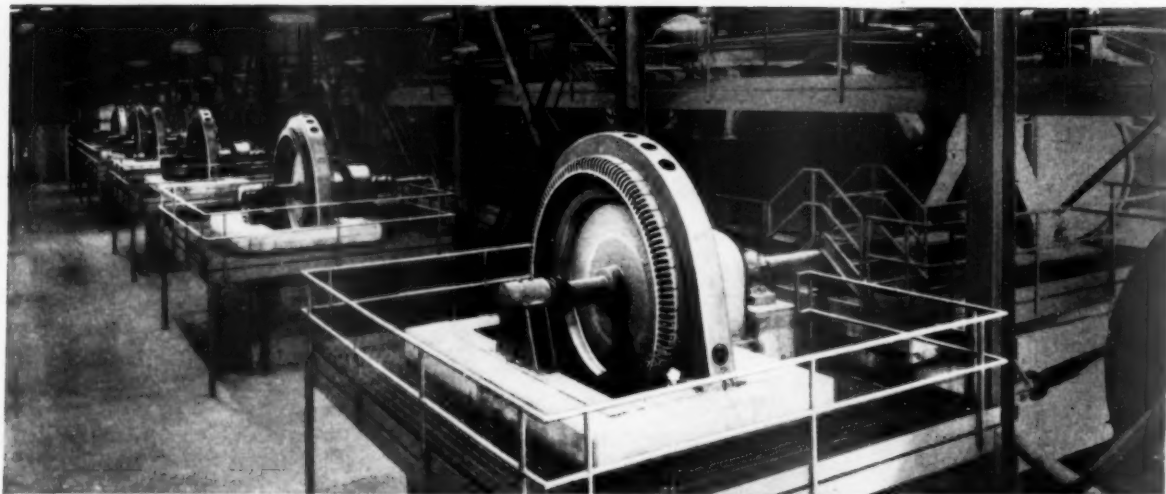
## ENGINEERING REPORTS:



**1 ON-THE-SPOT SEPARATION** is done on this barge, which floats in a man-made pond near the Bunnell plant. Walking dragline (in background) dumps sand containing coquina shell

into bins. These are five of twelve totally enclosed fan-cooled G-E Tri-Clad<sup>®</sup> gear-motors that keep conveyor loads moving to the screening process—in this corrosive atmosphere.

# Lehigh Portland Cement Company's



**2 HIGH POWER FACTOR** helps plant operate economically. Three of these 700-hp, 180-rpm, 4000-volt synchronous

motors drive primary wet ball mills that pulverize raw material; three others grind cement clinker after burning.



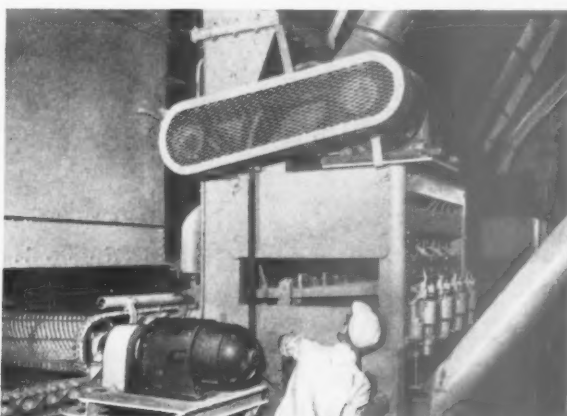
**3 KILN-SPEED CONTROL** over wide range is made possible by G-E adjustable-voltage d-c drives. Each kiln uses a 125-hp motor, and an electrically co-ordinated feeder motor.



**4 RELIABLE POWER SUPPLY** for kiln drives includes G-E 1000-kva load-center substation, two G-E synchronous m-g sets, and a-c and d-c control (background).



**5 DEPENDABLE POWER-SWITCHING** is provided by 4160-v metal-clad switchgear in a pressure-ventilated room. Vertical-lift design means you *see* when breaker is disconnected.



**6 CONTINUOUS FLOW** of finished cement through pack-house is aided by this G-E Tri-Clad motor driving bagging machine, and gear-motor driving conveyor for bagged cement.

\*Reg. trade-mark of General Electric Company.

## new plant powered by G-E system

### G-E drives help maintain fast, smooth output of coquina-shell Portland cement

To help relieve the prevailing cement shortage in Florida, the Bunnell plant of the Lehigh Portland Cement Company has been completed with a production capacity of 4000 barrels a day. Here, for the first time in the U.S., coquina shell is being used in the manufacture of Portland cement.

In cooperation with F. L. Smidth & Co. engineers, General Electric cement industry application engineers developed a complete electrical system integrated with each plant process to facilitate a smooth-flowing, continuous operation. Each step, carefully linked with an

efficient materials-handling system, is powered and controlled by G-E drives. Success of this coordinated planning is evident with today's fast-moving production flow.

#### REACH PEAK EFFICIENCY THROUGH ELECTRIFICATION

Use G-E engineering aid early in your electrical modernization planning to avoid production bottlenecks, assure optimum output. Contact your G-E Apparatus Sales Office for Bulletin GEA-5748 or write to General Electric, Section 658-13, Schenectady 5, New York.

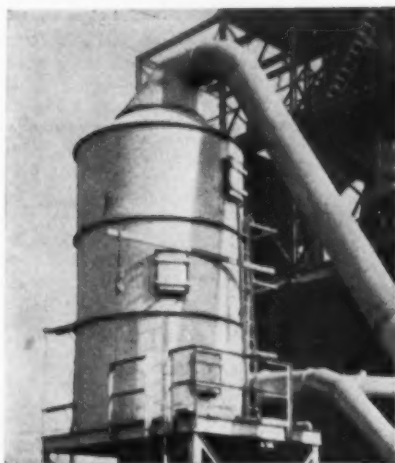
**Engineered Electrical Systems for the Rock Products Industry**

**GENERAL  ELECTRIC**

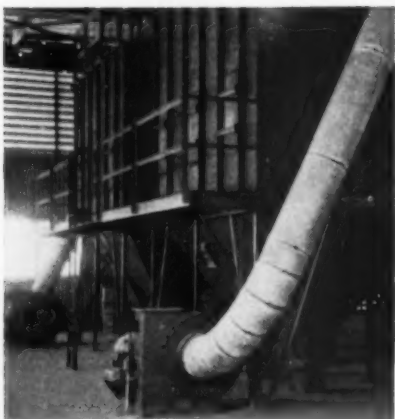
## For All Fume or Dust Collection—

# Norblo

brings you outstanding  
efficiency in three  
types of systems

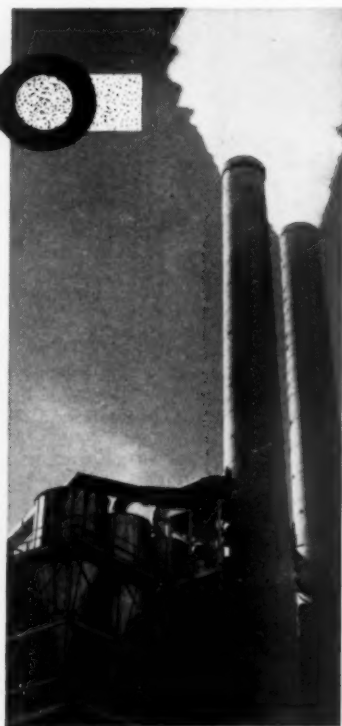


Hydraulic



Automatic Bag Type

Norblo Systems make outstanding records for high recovery with low operating and maintenance costs. Profit by Norblo's 30 years experience in heavy duty collection and Norblo development of these basic types of equipment. For good advice on dust or fume problems, consult Norblo.



Centrifugal

**W**HATEVER your need for dust or fume control, Norblo builds rugged, efficient equipment in Centrifugal, Hydraulic and Bag type collecting systems. These three types, frequently used in certain combinations, provide economical dependable control as required in smelting, rock products, chemical, milling and processing fields.

### The Northern Blower Company

Engineered Dust Collection Systems for All Industries

6408 Barberton Ave. Olympic 1-1300 Cleveland 3, Ohio

### Fine Grinding

(Continued from page 107)

material first passes through a small, company-made tumbling washer barrel that discharges to a 4- x 14-ft. Seco three-deck screen which produces three sizes of washed dolomite that are binned; a  $\frac{1}{2}$  in. to 1  $\frac{1}{2}$  in.; a  $\frac{1}{4}$  in. to  $\frac{1}{2}$  in.; a  $\frac{3}{8}$  in. to  $\frac{1}{4}$  in. Minus  $\frac{1}{8}$  in. from the lower deck of the screen passes to a 16-in. Eagle sand screw. A 3- x 6-ft. Diester single-deck screen is to be installed between the lower deck of the Seco screen and the sand screw. This screen, with a 40-mesh cloth, will take off a plus fraction of  $\frac{1}{8}$  in. to 40 mesh. The Eagle screw will then receive only the minus 40 mesh sand.

Wash water from the Eagle screw goes to a small settling pond and the settled material is bailed out occasionally and processed for agstone. The settling pond overflows to a second pond and water from that pond is reused.

The plus fraction from the top deck of the 4- x 12-ft. Seco screen, operated dry, falls to the 3-ft. Ty Traylor final crusher. Material from the other two decks can either go to the 4-ft. Symons, the 3-ft. Ty, or to belt No. 5 serving both crushers, or, to both the belt and the crushers. Here a high degree of flexibility is apparent. Belt No. 5 delivers to a 4- x 16-ft. three-deck Seco screen, operated dry, and all but the fines are binned. The fines, or minus  $\frac{1}{8}$  in., fall to belt No. 6 and are delivered to a second 5- x 16-ft. Seco two-deck screen, operated dry, where the three sizes of stone are binned. The top deck of the first mentioned 4- x 16-ft. Seco screen is changed quite often to suit market conditions. However, the lower deck produces a  $\frac{1}{8}$ -in. material. The second deck produces  $\frac{1}{8}$  in. to 1  $\frac{1}{2}$ -in. which can be binned or deposited on Belt No. 6 when combined materials from  $\frac{1}{4}$  in. to 1  $\frac{1}{2}$  in. are needed.

Truck bins are provided for all the commercial sizes of stone and excess material is ground stored. Reclaiming from stockpiles is done by Barber-Greene and Haiss loaders augmented by a 1  $\frac{1}{4}$ -cu. yd. Osgood shovel and a 1-cu. yd. Osgood clamshell. All material is trucked from the plant and weighed on a pair of truck scales that are 45-ft. long and of 50-ton capacity.

Myron J. Wurtenberger is president and treasurer of Frontier Stone Products, Inc., and E. C. Wurtenberger (his wife) is secretary. James M. Switzer is vice-president. Hazel N. Lang is assistant secretary and assistant treasurer. Robert S. Maxwell is plant superintendent. H. E. Coleman is sales manager, and Raymond C. Betsch is assistant sales manager. Clinton Carpenter and Claude Sherman are foremen. Other members of the staff are: Karl W. Strauss, Merilyn C. Stern, Frances S. Cramer, Marguerite W. Boye, and Gertrude Bradley.

## Operating Session, N.C.S.A.

(Continued from page 98)

John W. Moffat, superintendent, Inland Lime & Stone Co., Gulliver, Mich., covered the subject of safety at the operating men's session with a paper on "The Place of the Superintendent in the Prevention of Accidents." The speaker said that an analysis of accident reports indicated that most accidents are caused by unsafe conditions or unsafe practices, or combinations of the two. He stressed the importance of guarding equipment, the non-removal of these guards, adequate protective equipment (and clothing), and the immediate correction of unsafe practices by the superintendent and foreman. Personnel training is important and starts the day a new man is hired. Such men are given a 39-page safety rules manual that includes an additional 13 pages of work rules. Failure to observe these rules can end with discharge.

The speaker stressed the importance of the foreman in the unrelenting drive for safe practices. The foreman must make sure that all his men are not in ignorance of existing hazards. Foremen must assay the physical shortcomings of their men and know the degree of attention (or inattention) that each man gives to his work and be on the alert for men who are indifferent to familiar hazards. Mr. Moffat discussed the humanitarian aspects of safety work saying that this phase was important to the man, but that compensation costs to the company was a subject in which an employee had no deep seated concern. While much of Mr. Moffat's talk dwelt with foremen, he classed the superintendent in the general pattern but with higher responsibilities. The superintendent must believe in safety and must think safety as a part of his continuous supervisory work, and must help sell the idea to all men under him.

### "Tricks of the Trade"

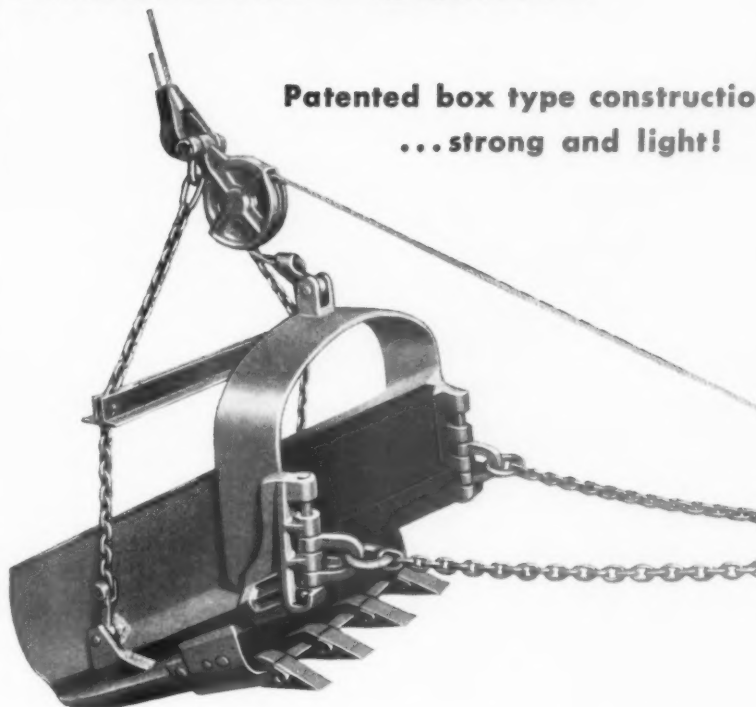
Edward J. Nunan, sales engineer, Federal Crushed Stone Corp., Buffalo, N.Y., had for his subject, "Tricks of the Trade." It appears that requests were sent out to producer members, asking them to submit operating ideas that might be helpful to the stone producer. The responses were essentially in letter form, and Mr. Nunan acted as moderator and read these communications to the membership. Slides were also shown.

The Bethlehem Steel Co. responded with four suggestions from the Bridgeport, Penn., quarry and one from its Steelton, Penn., operation. The Carbon Limestone Co., Lowellville, Ohio, sent in two helpful suggestions and the following companies sent in one idea each: Eastern Rock Products Co., Utica, N.Y.; General Crushed Stone Co., Rock Hill, Penn.; Lynn Sand & Stone Co., Swampscott,

(Continued on page 174)

## Make more profits with

# WELLMAN-WILLIAMS DRAGLINE BUCKETS



**Patented box type construction  
...strong and light!**

**T**HE Wellman-Williams Dragline Bucket is perfectly balanced, light in weight, has a wide digging radius and hitch connections for fast adjustment of digging depths. Alloy steels provide maximum strength with minimum dead weight. Teeth are made of manganese steel and are reversible. Perforated type dragline buckets also available.

**It's a WELLMAN—built to dig and last while digging.**

## THE WELLMAN ENGINEERING CO.

CLEVELAND 4, OHIO

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for free  
bulletin**

The Wellman Engineering Company  
7040 Central Avenue, Cleveland 4, Ohio

Please send me a free copy of bulletin on:

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|--|--------------------------------------|
| <input type="checkbox"/> Clamshell Buckets | <input type="checkbox"/> Stone Grabs |
| <input type="checkbox"/> Dragline Buckets  | <input type="checkbox"/> Log Grabs   |

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Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

Position \_\_\_\_\_ Company \_\_\_\_\_



# We tie truck axles in

## in the new Timken-Detroit indoor proving ground... and only

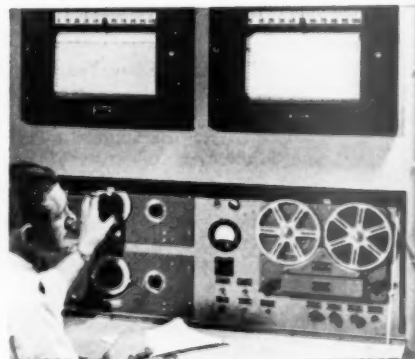
**We twist, shock-load, abuse, and torture them. Match every conceivable hauling condition. Then add a few brutal tricks of our own!**

**Why?** So you'll know in advance, and for sure, that a Timken-Detroit axle can take the punishment it was designed for. More rugged, grueling punishment than any other axle made!

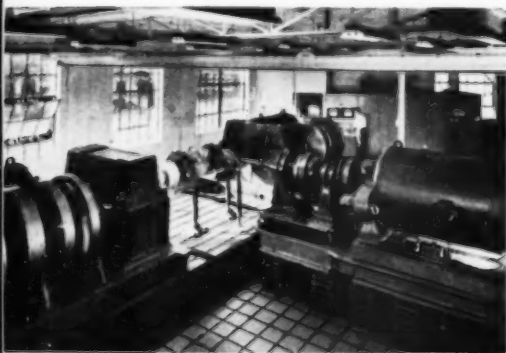
To prove it, we capsuled a multi-thousand acre proving ground into one room. Here our engineers can put 50 years of experience in building axles for trucks,

buses and trailers to work—subjecting axles and gearing indoors, to any outdoor operating condition.

Such exacting research pays off for you in: longer axle life; less maintenance, repairs and downtime; reduced operating expenses. This is why Timken-Detroit axles are preferred by manufacturers and operators everywhere.



**This is our "truck driver."** He works in our "Torture Chamber." Above him are graphs showing speed and torque performance under any operating condition he chooses... soft ground at full load... mountains... express highways or side roads. With special dials, recorders and electronic devices, he actually drives the axle with scientific accuracy from his chair!



### How TDA proves axle quality in this "Torture Chamber"

We pick one of our axles at random... then duplicate a hauling condition, hour after hour, day after day... simulating half a million miles of the toughest driving situations in just a few days. Or "invent" a test like going up hill with a full load from California to New York non-stop. There is no other axle testing like it in the world!



**Soft ground? Heavy load**—all up-grade? That's a tremendous strain on an axle. But it's nothing compared to what we do in the indoor proving ground! For instance—we take an axle shaft and twist it 14° forward and backward, 36 times a minute, 24 hours a day, week after week. And that's only one test to give you low-cost performance, long axle life regardless of your hauling conditions.

**Hauling wet mix?** You need Timken-Detroit axles—duplicates of axles that have been given the "works" in our indoor testing laboratory. Simulating the punishment the axle would get hitting a chuck hole with a capacity load every 4 seconds, 24 hours a day, month after month! And it's all done to save you money on maintenance and repairs—make you more money every load.

# knots

**Timken has it!**

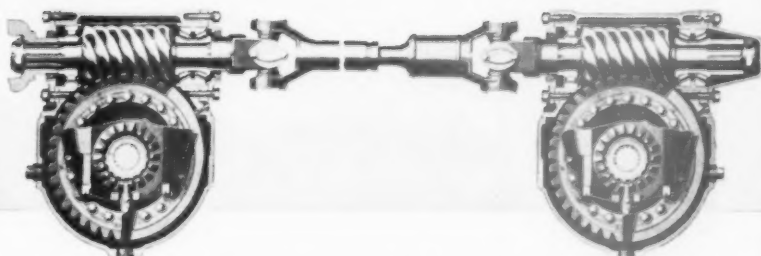
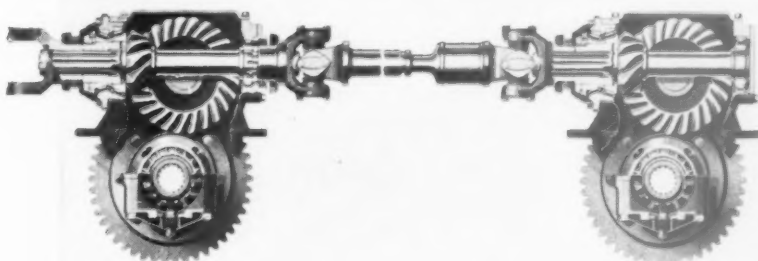
**TIMKEN**  
*Detroit*  
**AXLES**

TIMKEN DETROIT AXLE DIVISION  
ROCKWELL SPRING AND AXLE COMPANY  
DETROIT 32, MICHIGAN



**"TORTURE-TESTED"**  
**to Save Money on the Job**

**WORLD'S LARGEST MANUFACTURERS OF  
AXLES FOR TRUCKS, BUSES AND TRAILERS**



**Choose from 2 types of tandem drive  
rear axle units for "Million Mile" performance**

1. Top-mounted hypoid-helical double-reduction final drive. First reduction is hypoid gear and pinion—second is helical spur-gearing. Hypoid gearing, developed for heavy-duty trucks by Timken-Detroit, assures outstanding performance and low maintenance costs for operators everywhere. Large pinions, greater tooth contact give TDA hypoid-helical gearing the ability to stand the "gaff" of extreme shock loads and hard, grueling hauling service.
2. Famous patented FJ worm gearing, pioneered by Timken-Detroit. "Through Drive" type . . . direct transmittal of engine torque through forward driving axle to rear driving axle. Permanently silent . . . simple, sturdy . . . stands extreme shock loads without damage. Large diameter worm and worm wheel . . . increased capacity roller bearings . . . easy lubrication . . . light weight make FJ highly desirable for high speed service on any kind of grades.

*Plants at: Detroit, Michigan*

*Oshkosh, Wisconsin • Utica, New York • Ashtabula, Kenton and Newark, Ohio • New Castle, Pennsylvania*



# GRINDING RODS

*CF&I grinding rods grind efficiently and economically. They are rolled from special analysis steels to wear evenly and resist abrasion. Strict quality control from ore to finished product means that CF&I grinding rods are tops in performance and value.*

Other CF&I Steel Products for the Sand and Gravel Industry

Cal-Wic Industrial Screens	Wickwire Rope
Grinding Balls	Light Rails and Accessories



## GRINDING RODS

THE COLORADO FUEL AND IRON CORPORATION

DENVER • OAKLAND • NEW YORK

## Operating Session, N.C.S.A.

(Continued from page 171)

Mass.; and New York Trap Rock Corp., Newburgh, N.Y.

The first suggestion described by Bethlehem Steel Co., Bridgeport, Penn., was an air hose coupling similar to the type used by railroads for use in quarries. It is designated as No. 73303 (Westinghouse Air Brake Co.), or No. N-3700 (New York Air Brake Co.). Assemblies are made in 100-ft. lengths with 1½-in. pipe nipples at each end with the coupling screwed into the nipple. No tools are needed to connect or uncouple.

The second idea submitted by Bethlehem Steel Co. was related to the use of an air starting motor for quarry trucks, mainly for use during cold weather. The starting motor is a Model 9BM made by Ingersoll-Rand Co. The air receiver for the starter is mounted on the running board and receives its air from the brake air tank with a check valve between. On opposite ends of the tank are welded two pipe fittings. One is for a flexible ¼-in. line which goes to a type 2-BA-1, No. 53873D Westinghouse Air Brake Co. push-button pilot valve mounted on the dash board. From the other fitting, a ¾-in. line connects to an Airmatic starter valve No. UP-2-750-NC, which is made by Airmatic Valve, Inc., and this line goes to the starter motor. A return line from the pilot valve connects to the starter valve and opens it when the pilot valve button is pushed.

The air starter will turn the truck engine over until it starts. If necessary, the first truck started can supply air for remaining trucks. The initial expense was said to be \$450. Towing expense and the fire hazard from shorted battery cables are practically eliminated.

The third idea from the Bridgeport operation related to the use of rubber bands cut from old 14.00 x 24 inner tubes in place of tension springs on the low-head Allis-Chalmers screens.

The fourth idea was related to shovel hoist cables. The cables were ordered with the loop at the center point and fastened to the reel lagging and then wound on the reels so that both ends appeared at the outside of the reel. The ends are tapered and welded with ¾-in. becket wire rope loops attached. To install, two ¾-in. wire rope sections are used in place of the hoist rope. One end of each is attached to the drum and the other ends to the looped ends of the hoist cable. The operator then pulls the hoist cable over the sheaves and down to the hoist drum. The procedure insures a clean cable as it does not touch the ground and eliminates the unsafe practice of men climbing the shovel boom. The becket loops are also useful to attach the cables to the hoist drum.

The Steelton quarry suggestion related to a well drill auger facing tool.

(Continued on page 176)

## How does your shovel compare with a **BAY CITY?**

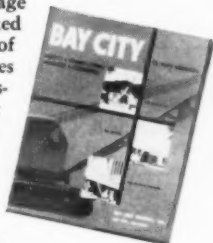
Make a comparison *NOW* of the brief, essential specifications listed here and prove to yourself why dollar for dollar the **BAY CITY** heavy-duty  $\frac{3}{4}$  yard Model 45 is today's biggest value in excavating and material handling equipment. This is only part of the story — consider the design features for full convertibility — keep in mind the operating advantages that assure snappy swing, quick control, easy operation, and fine balance. For the full story call your **BAY CITY** dealer today. **BAY CITY SHOVELS, INC.** • Bay City, Michigan

SPECIFICATION	BAY CITY Model 45	Other $\frac{3}{4}$ Yd. Shovels
Weight (as shovel)	46,500 lbs.	
Power (std. gas)	81 HP @ 1200 RPM	
Engine Displacement	517 cu. in.	
Shovel Boom	19' 0"	
Crowd	One Piece Chain	
Digging Radius 45°	28' 1"	
Crane Boom (Std.)	35' Pin-connected	
Crane Capacity, 10' Rad.	28,500 lbs.	
Hoe Boom	20' 0"	
Digging Depth	19' 6"	
Bases	Cast Alloy Steel	
Crawler Bearing Area	24" Shoes—5930	



### WRITE for this CATALOG

Get this 20-page catalog, packed with pictures of parts, assemblies and jobs, illustrating the big value built into this  $\frac{3}{4}$  yard crawler. It's yours for the asking.



222



# BAY CITY



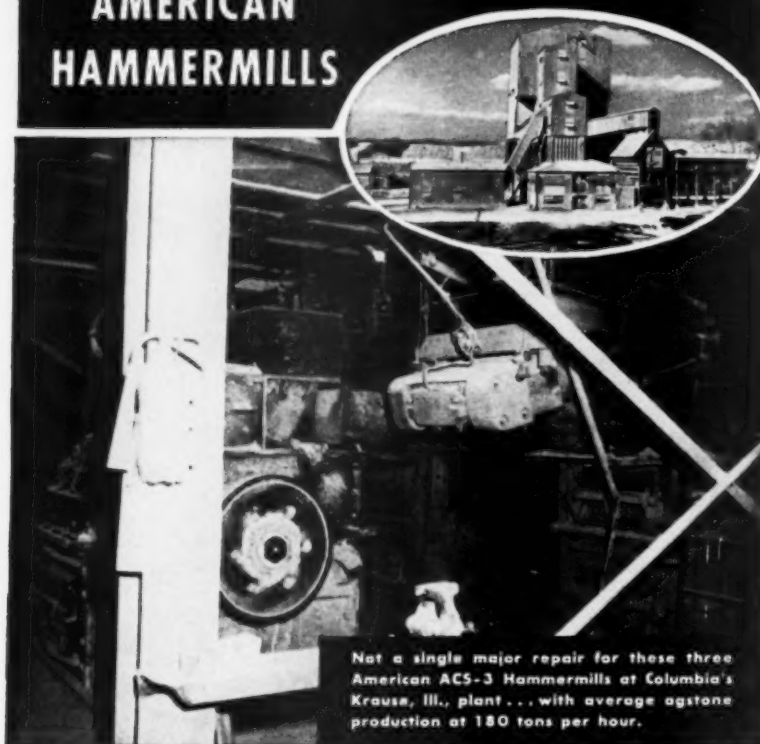
**SHOVELS • CRANES • HOES • DRAGLINES • CLAMSHELLS**

ROCK PRODUCTS, April, 1954

175

# Leading Agstone Producer Turns Out 717,909 Tons in 30 Months with .....

## AMERICAN HAMMERMILLS



Not a single major repair for these three American ACS-3 Hammermills at Columbia's Krause, Ill., plant... with average agstone production at 180 tons per hour.

**T**he Columbia Quarry Company, a pioneer in the production of agricultural limestone, is producing today what is believed to be the world's largest single agstone output. In one year, they have shipped over 5% of the national tonnage. With this background of rock-crushing experience, Columbia has chosen to install American Hammermills in its three plants at Krause, Ill., Valmeyer, Ill., and Elsberry, Mo. At the Krause plant alone, three Americans have produced over 717,909 tons of agstone in the first 30-months—even though feeding on exceptionally hard Lower St. Louis Limestone.

Since their installation, *not one major repair* has been necessary on these Americans—in fact, no attention at all, except for the routine refacing of hammers and grate bars.

Nothing on the market today can equal these rock-hungry American ACS-3's for capacity, durability, or low cost of operation. Get all the extra-profit facts today. Write for free Bulletin "Better Stone Crushing".



*Originators and Manufacturers of Ring Crushers and Pulverizers*

1245 MACKLIND AVE. • ST. LOUIS 10, MO.

## Operating Session

(Continued from page 174)

The slides showed a drawing of a facing device for well drill auger stems that could be used without removing the auger stem from the drill. It was said that about 15 min. was required for the operation. It is a rugged piece of equipment, low in cost and has been used very successfully.

The first idea sent in by Carbon Limestone Co. relates to a high capacity portable air compressor. A 600 c.f.m. unit was inadequate and electric drives were also preferred. A used truck trailer was purchased, and mounted on an 830 c.f.m. Ingersoll-Rand XIE, 125-hp. L-design compressor. Also mounted on the chassis are an air receiver and a Young water jacket cooler. This "package" is mounted in a steel (¼-in.) housing that protects it from flying stone. A wagon tongue is a part of the assembly. A small air hoist and drum are mounted near the front end, and this is used to move the compressor by fastening the end of the cable to a steel stake and pulling the compressor ahead accordingly. Power is delivered to the unit by heavily insulated power cables. The company has two units in service. The compressors are moved up close to the drills. Hot, clean, alcohol-free air goes to the drills, and one man is used part time in looking after the compressors. The second helpful suggestion from this company related to a description of the General Electric Co. two-way radio system installed in the plant office, on the two loading shovels, and on each of the seven diesel locomotives that haul rock to the plant. In addition the radio equipment is installed in the trucks of the superintendent and foreman. The quarry is about two miles from the plant and this innovation has saved much time and money.

Eastern Rock Products Co., Utica, N.Y., presented an idea related to a constant level re-crusher feed control to insure a constant choke feed at the receiving opening of the crusher. A belt conveyor is used to feed the crusher. The motor is designed for instant starting and stopping several times per minute. By use of a mercury switch mounted on a pendulum mounted at the throat of the re-crusher, the belt conveyor functions and over-feeds the reduction unit. When the throat of the crusher was full of rock the pendulum was in such a position that it stopped the belt conveyor momentarily. When the crusher was low in feed the pendulum hung vertically, and the conveyor started in this position. The use of a magnet ahead of the fine reduction crushers was advocated.

The General Crushed Stone Co. described the use of Compound M-R as a wetting agent to reduce dust at their Rock Hill, Penn., quarry. This chemical is added to water and used as a spray. It requires 1½ gal. of M-R compound per ton of stone. The



## *New improved vibrating screens...wider choice of special types...highlight displays at Sand & Gravel & Crushed Stone Shows*

Visitors at the Sand and Gravel and Crushed Stone Shows in Chicago, February 15-19, 22-24, demonstrated intense interest in exhibits showing latest developments in modern vibrating screens.

Among the vibrating screen exhibits, one receiving the keenest attention from the crowds was that of the Deister Machine Company, one of the pioneers in the specialized design of machinery for the aggregates industry. Deister personnel were on hand, to answer the many questions regarding the company's newest developments.

Particular attention was given to the display of the new Deister Heavy-Duty Type UHS Vibrating Screen, shown in

the photo above. Designed for greatest speed and efficiency, the new Type UHS features a life-time unitized vibrating mechanism—precision-built and jig-assembled—with two-bearing construction and oil-bath lubrication. Full explanation was presented on such features as opposed elliptical throw, low screening angle, automatic screen cloth tension, adjustable throw and fully cushioned vibration.

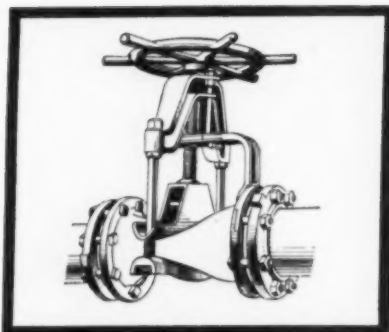
On this Type UHS, the screening medium is mounted in divided sections, and held under tension transversely. These screen sections are identical in size for easy interchangeability. The new Type UHS is available in 3', 4' and 5' widths; 10', 12' and

14' lengths; 1, 2 and 3 deck.

Deister personnel were also questioned by visitors on the complete line of Heavy-Duty Types ETP and ETU Vibrating Screens, and on the Model SL Ag Lime Screen which permits extremely rapid stroke-cycle for maximum separation efficiency of fine, moist materials. Deister Types ETP and ETU are provided in 1, 2, 3, and 4 deck models in sizes from 2½' wide x 4' long to 5' wide x 10' long.

Visitors were invited to write for more specific details of the over 100 standard Deister types and models.

Deister Machine Company, 1933 East Wayne St., Fort Wayne 4, Indiana. (Advertisement)



**MASSCO-GRIGSBY**

**rubber  
PINCH VALVES  
FOR  
ABRASIVE  
PULPS**

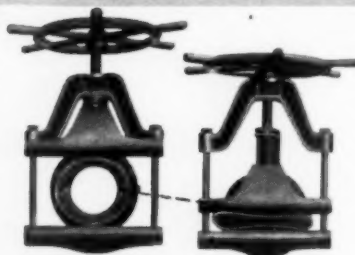
**IT'S HINGED...**

**FOR LONGER WEAR**

Recesses molded into opposite sides of the sleeve serve as "hinges" during compression. This patented feature prevents undue strain and eliminates breakage and excessive wear due to valve adjustments.

**MOLDED RUBBER RESISTS ABRASION  
... gives Long Life without Maintenance**

The sleeve is made of molded natural rubber reinforced with fabric; will withstand pressures to 150 lbs. per sq. in., temperatures to 180° F.; freezing temperatures are not harmful.



The Massco-Grigsby Rubber Pinch Valve has a straight, unobstructed flow passage which eliminates high friction losses; there are no packing glands; gives positive, leak proof closure; withstands all chemicals not harmful to rubber or neoprene.

Sizes: 1" to 12"

\*Both Marry and Massco are registered trademarks.

**WRITE  
FOR  
CATALOG**

**The  
Mine & Smelter  
Supply Co.**

DENVER 17, COLORADO

OFFICES IN: SALT LAKE CITY, EL PASO, 1775 BROADWAY, N. Y. C.

REPRESENTATIVES IN FOREIGN COUNTRIES

chemical penetrates cleavage planes in the rock, dampens the surface with a minimum of moisture and in essence wets the dust before it forms. Automatic nozzle control units are a part of the installation so if units run empty the sprays automatically stop and resumption of flow of rock reactivates the sprays. The paper outlined the location of the sprays with most of them being at the discharge of the several crushers involved.

The idea submitted by the Lynn Sand & Stone Co. related to the use of 60-in. dia. concrete pipe into which is installed a smaller (15-in.) dia. concrete pipe. The smaller pipe is the pole-socket for use in installing poles in the company's quarry. These "doughnuts" are held in place by a concrete top and bottom cap with the interstices filled with crushed rock. The cost of a 60-in. length of concrete pipe was given at \$66.20 for the better grade of pipe and seconds at about \$44. The smaller pipe cost \$7.28 and for seconds, \$4.00. The 2 cu. yd. of concrete for the top and bottom caps cost \$22 and labor \$15. The total cost per doughnut was \$85 to \$111. To erect, the pole is spotted in the doughnut and held in a permanent vertical position by wood wedges.

The New York Trap Rock Corp. described an oil-fired melting pot for zinc of such design that it could be lowered to the crusher level. The pot holds 4000 lb. of zinc or enough for a maximum pour. A second pot is available for babbit. By having the hot metal close to the working place, a one-pour job can be made and this has added considerable life to the units involved. Previously molten metal had to be carried down a flight of steps in small hand ladles and as many as 300 separate trips were involved.

**Operating Session, N.A.L.I.**

*(Continued from page 101)*

ducer told about the use of a shed that was 200 ft. long with a 35-ft. high roof, and a Massachusetts producer described stockpiling against one wall of the quarry. The use of Fuller-Kinyon Airlifts for handling fine material also was described.

**Business Meeting**

K. K. Kinsey, past-president of the association, presided at the Monday morning session, after the showing of a movie called "Grass" that was sponsored by the U. S. Department of Agriculture. The session was a business meeting with the following men reading reports on the subjects indicated:

Alvin R. Armbrust, Fayette Limestone Co., Ohio, treasurer's report; C. A. Munz, Eastern Rock Products Co., N.Y., auditing and finances; Leonard S. Fry, Fry Stone & Coal Co., N.Y., membership; John M. Deely, Lee Lime Corp., Mass., legislative; H. C. Krause, Columbia Quarry Co., Mo., percentage depletion; and W. E. Stone, Piqua Stone Products Div.,

**MANGANESE STEEL  
CASTINGS**

for  
PULVERIZERS  
CRUSHERS  
ROLLS  
SCREENS



for  
SHOVELS  
DREDGES  
CRANES  
CONVEYORS

**The Frog, Switch & Mfg. Co.**

Established 1881

CARLISLE, PA.



Alvin R. Armbrust, left, and W. E. Stone, Piqua, Ohio

Armco Steel Corp., Ohio, promotion.

Robert M. Koch, executive secretary of the National Agricultural Limestone Institute gave his report which essentially was an outline of the N.A.L.I. Washington, D. C. activities, and his relationship with producers at individual levels. Mr. Koch stressed the importance of state and area associations. He also told of some of the legislative actions that were pending at Washington, D. C., which may be enacted and which appeared to be favorable. The speaker thought that 1954 would be a big year for the ag-stone producers.

#### Form N.A.L.I. Manufacturers' Division

On February 20, manufacturers' representatives voted to formalize a Manufacturers' Division of N.A.L.I. E. C. Farrer of the American Cyanamide Co., was elected acting chairman; W. H. Van Buren, Quaker Rubber Corp., was elected acting secretary, and Harry Wendler, Highway Equipment Co., was appointed chairman of the membership committee. R. C. Johnson, Simplicity Engineering Co., Jules Jenkins, Vibration Measurement Engineers, and A. M. Lowrey, Quaker Rubber Corp., were appointed as a by-laws committee. The N.A.L.I. by-laws were amended at the annual convention to provide for a manufacturers' division. Election of permanent officers and the adoption of by-laws for the division will be acted upon at the next annual meeting in Washington, D. C., in the week of January 16, 1955.

#### Welding Show and Meeting

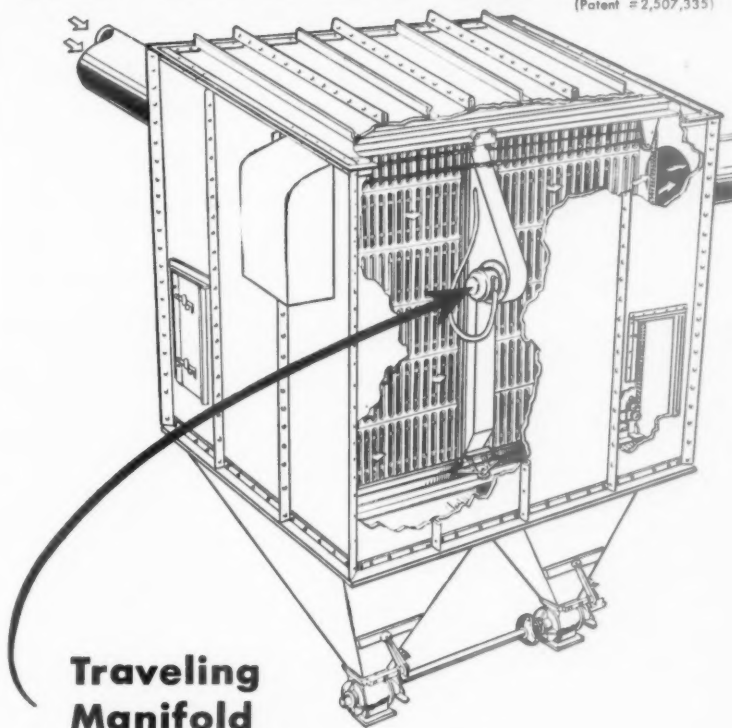
THE AMERICAN WELDING SOCIETY will hold its second welding show at the Memorial Auditorium, Buffalo, N.Y., May 5-7, with the society's national spring technical meeting to be held at the Hotel Statler, Buffalo, May 4-7.

The welding exhibit reportedly will feature the most elaborate display of welding equipment and accessories ever assembled. "Every type of industry will find something new and useful among the exhibits," according to Joseph G. Magrath, national secretary.

- Continuous automatic operation
- Constant air volume and suction

## with NEW PANGBORN 'SELF-CLEANING' COLLECTOR

(Patent # 2,507,335)



### Traveling Manifold

makes new collector self-cleaning

Now you can get continuous collector operation and constant system performance and efficiency with the new Pangborn "Self-Cleaning" Cloth Screen Dust Collector. Uniform air flow and resistance is assured without shutdown of the system for periodic cloth cleaning.

Write today for full details about the new Pangborn "Self-Cleaning" Collector that's economical to install, operate and maintain — gives you constant system performance and efficiency. Address: PANGBORN CORPORATION, 4300 Pangborn Boulevard, Hagerstown, Maryland.

#### Get all these important advantages

- Uniform air flow and suction
- Continuous, automatic operation
- Positive reverse air cloth cleaning
- High collection efficiency
- Reduced space requirements
- Low initial operating and maintenance costs
- Unit construction permitting flexibility of arrangement.

# Pangborn

## DUST CONTROL


STOPS THE DUST HOG from stealing profits

PANGBORN'S 50TH ANNIVERSARY • 1904 - 1954

ROCK PRODUCTS, April, 1954

179

**BACK OF EVERY  
H&B SAND AND GRAVEL  
PUMP**



**are 87 YEARS of Engineering Experience**

**PLUS—the  
most complete stock of  
parts in the industry—  
assuring dependable  
PERFORMANCE and  
dependable SERVICE.**



H & B sand and gravel pumps are available in two general types: STANDARD (in 4", 6" and 8" sizes) with semi-steel parts, for ordinary working conditions and moderate heads; and DREADNAUGHT (6", 8", 10", 12" and 15" sizes) with manganese steel parts, for heavy duty jobs with stringent head conditions. Write for Bulletin DP-147.

**HETHERINGTON & BERNER, INC.**

755 KENTUCKY AVENUE

INDIANAPOLIS 7, INDIANA

## ROCK PRODUCTS

The  
"HOW TO DO IT"  
MAGAZINE

### Silica from Sandstone

(Continued from page 130)

$\frac{3}{4}$ -cu. yd. Tractomotive bucket into a hopper from which it is drawn to be dried. A horizontal belt feeder 10 ft. in length transfers the sand from the hopper to an inclined belt conveyor for direct discharge into a 6- x 60-ft. York rotary dryer. Rate of feed is adjusted by regulating the height of the outlet gate on to the belt feeder.

The dryer has eight internal lifters and is fired by natural gas under induced draft. Natural gas is taken from a 125 p.s.i. line and reduced to 24 p.s.i. for firing the dryer. Temperature of the discharging sand is 325 deg. F.

Finishing screens are atop the finished material bins which are alongside the dryer. Delivery overhead is by a 70-ft. centers enclosed belt bucket elevator. In order to protect this belting from the heat, a short conveyor with heat-resisting belt was first tried, to transfer the hot sand to the bucket elevator. The belting puffed from the heat and has been replaced by an inclined, water-jacketed screw conveyor. It is a 9-in. diameter screw with  $\frac{1}{2}$ -in. clearance in its pipe, jacketed with a 12-in. diameter pipe. Purpose of the incline is to obtain a rolling action of the particles within the pipe, which is effective in reducing wear, and to permit all material to contact the water-cooled surface. Water is pumped through the jacket at the rate of 1400 g.p.h. by the well pump. The screw conveyor is effective in reducing the temperature of the sand by 50 to 60 deg. F.

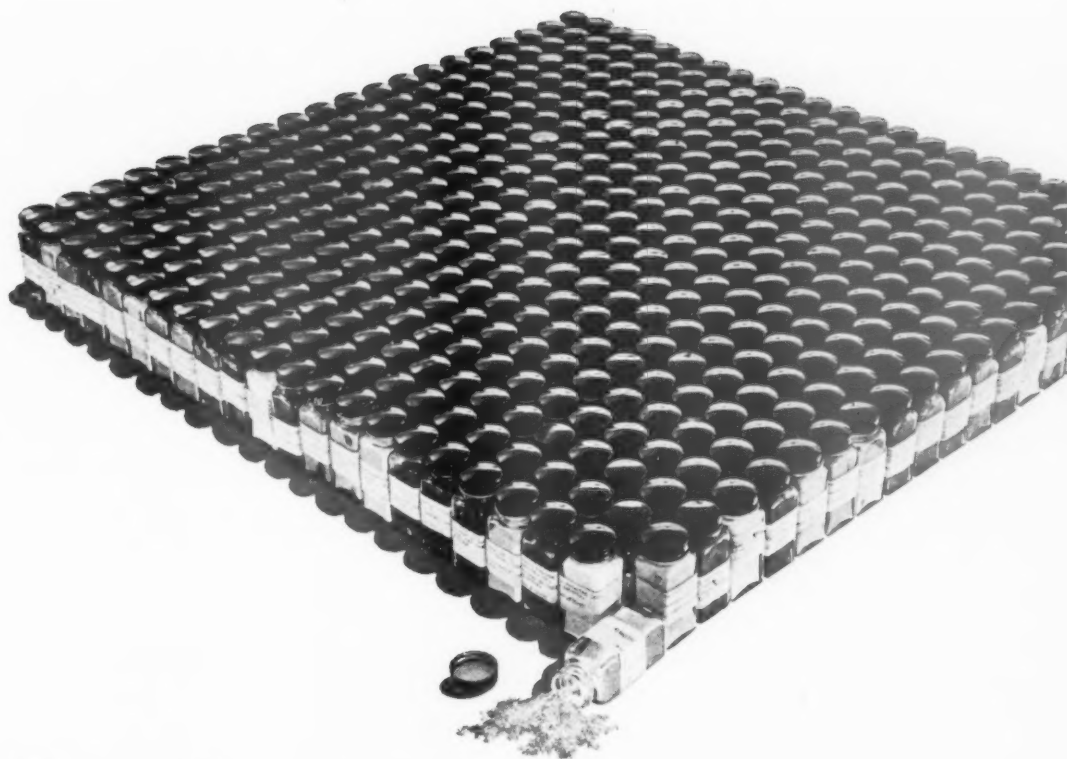
Dried sand is screened over two 42- x 96-in. double-deck vibrating screens in parallel, and glass sand and molding sand drop into separate bins. Oversize material comprising 15 percent of the total is dropped into a third bin. It is planned to install a GP-1512 Williams hammermill to handle the oversize, when the same bucket elevator will serve to complete the circuit with the vibrating screens.

Each of the three bins is 16 ft. in diameter and 30 ft. in height, holding 300 tons of product. In loading cars, sand is drawn from either bin on to a belt conveyor through a combination of five bin gates. The first, third and fifth gates are over the belt, and the second and fourth are offset on opposite sides of the center line in order to minimize segregation. The belt discharges into a short bucket elevator from which the sand is spouted into cars through flexible hose.

Samples are taken each hour from the chutes to the bins and gradation tests run. Chemical analyses are made once each week.

President and General Manager N. H. Bogie designed the plant, including the washer, and supervised its construction. It was built without benefit of engineering assistance, or even blueprints, and was erected by local men of no experience.

(Continued on page 182)



## Bottles of pure profit

These bottles contain samples of dust from literally hundreds of processing plants.

Naturally, because each bottle contained a different combination of dust, it presented a different dust collection problem . . . over 600 of them in the last 3 years!

From knowledge gained by planning, designing, and building dust collection equipment *tailored* to hundreds of different operating conditions . . . Buell has built an unmatched background of reliable and accurate knowledge and experience. From this knowledge, *gained the hard way*, Buell has developed three basic systems of industrial dust collection . . . made dozens of exclusive improvements in equipment.

Be sure you, too, have the latest facts. Send for your complimentary copy of our brochure — The Collection and Recovery of Industrial Dust. Write Buell Engineering Company, Dept. 17D, 70 Pine Street, New York 5, New York.

**buell**<sup>®</sup>



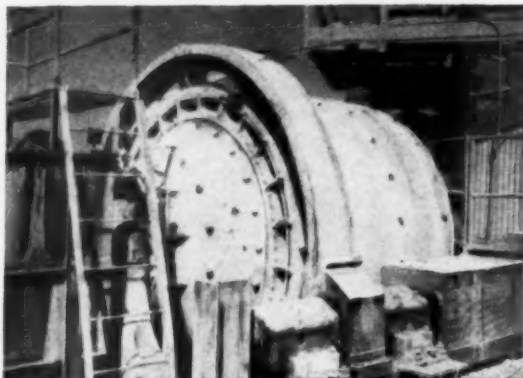
20 Years of Engineered Efficiency in  
**DUST COLLECTION SYSTEMS**

## CONICAL SCRUBBERS POPULAR IN WESTERN AGGREGATE CLEANING

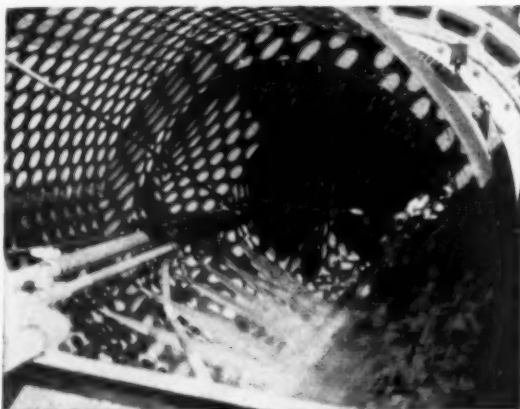
Within the past few years a number of stone products firms, particularly in the west, are adding the Hardinge Conical Scrubber to their line of processing equipment. They have all found it extremely effective as a rock-clay separator.

The principle of the Hardinge Scrubber is simple. Internal liners and special lifting flights create a turbulent "mass action" which is similar to the effect obtained by rubbing a handful of pebbles together between the palms in a bucket of water. This combined sliding-rolling-rubbing action in the presence of water definitely loosens all adhering clay or dirt from the rock. Water sprays, in the trommel discharge, remove the loosened clay and dirt completely.

Write for Bulletin 37-A-7.



View of a 10' x 66" Hardinge Scrubber cleaning crushed dolomite in a California plant. The trommel screen is at the left.



Close-up of trommel for Hardinge scrubber showing washing sprays and scrubbing action of the rock.

## HARDINGE COMPANY, INCORPORATED

YORK, PENNSYLVANIA • 240 Arch St. • Main Office and Works  
New York • Toronto • Chicago • Hibbing • Houston • Salt Lake City • San Francisco



**T.C.**

**WOVEN WIRE SCREENS**

ACCURATE • DURABLE • ECONOMICAL

The reliability of T.C. Alloy Screens has carried them into all parts of the world. Made in Standard and Special Weaves, with Square or Oblong Openings — from 10 mesh, .035" wire on up. Write today for Catalog No. 53.

**TWIN CITY IRON & WIRE CO.**  
35 W. WATER STREET • ST. PAUL 1, MINNESOTA

ROCK  
PRODUCTS  
FEATURES  
TIMELY  
INDUSTRY  
NEWS  
EACH  
ISSUE

Mr. Bogie formerly operated the Bogie Equipment Co. at Lexington, Ky., and sold equipment to the rock products and construction industries. He has been active in selling and installing equipment not only throughout Kentucky but in other states and in foreign countries. His experience has also included the operation of crushed stone plants, having owned his own plant at one time.

J. B. Alexander is first vice-president; W. D. Peyton is second vice-president; R. R. Holland, secretary-treasurer; and M. E. Brock is plant bookkeeper. Messrs. Alexander, Peyton and Holland are owners of the Alexander Stone Co. which operates a crushed limestone plant eight miles north of Marion.

## Oil-fired Lime Kilns

(Continued from page 138)

the center gasifier and on one side only of the side gasifiers. Thus they provide hot reactive surfaces with the carbon thereon tending to either combine with  $O_2$  or  $CO_2$  forming  $CO$ .

Within the gasifying chambers there is a complex activity. At the entrance combustion occurs. Some of the oxygen of the recirculating gas combines, raising the temperature of the chamber to some higher level conducive to increase rapidity of residual vaporization, oxidation, cracking and reduction reaction.

In the first reaction, the oxygen of the recirculating gas combines with the combustible, probably hydrogen that was liberated. At first the reactions may be  $2H_2 + O_2 = 2H_2O$  and  $C + O_2 = CO_2$ . After the temperature of the gasifier rises further, the endothermic reactions, such as  $C + CO_2 = 2CO$ , will come into play.

When conditions in the gasifier are right there is neither a smoky or a clear visible atmosphere therein, but a dark transparent, orange glow with neither smoke or flame.

Since oxygen is limited, the exothermic reactions are limited. The desire is but to build up to a temperature at which the vapors gasify and cause as much of the carbon in suspension to oxidize as possible.

Cracking of hydrocarbons is wanted, but not to the extent where large quantities of smoke are formed. The desire is for gas. It is a dirty, hot gas, but rich in illuminates and saturated hydrocarbons as ethylene, propylene, benzene and others.

This gas then is injected through the many gas ports among the voids of the lime in the kiln where, on contact with oxygen, combustion follows with a luminous far reaching flame, the luminosity being obtained from the released carbon component.

The injection of the gas formed as well as of the suspended carbon is under the stimulus of the recirculating gas.

The process sequence is thus: (1) preheating and pumping of oil; (2) building up of pressure; (3) atomiza-



## Break it up to bite size...with APEX®



**VERSATILE APEX** explosives are an important factor in the amazing improvements in breakage now possible with the newest Atlas development . . . Alternate ROCKMASTER® combined with Alternate Velocity Loading.

Apex is an economical ammonium nitrate explosive with a patented assembly having a water-proof gelatin core that offers these advantages:

- The water-proof core promotes complete detonation of the explosive in wet holes.
- Complete propagation of the column in any height face.
- Fluted-end cartridge permits easy loading.
- A wide range of strengths and velocities to choose from. Apex is available in 8 strengths: each in low, medium and high velocity.

For maximum breakage, better control of throw and economical production, team APEX explosives with the ROCKMASTER Blasting System.

For complete information on all Atlas Explosives Products, ask your Atlas representative for a copy of the new Atlas Explosives Catalog.



## ATLAS EXPLOSIVES

*"Everything for Blasting"*

ATLAS POWDER COMPANY,  
WILMINGTON 99, DELAWARE

Offices in principal cities

from SOAKING PIT  
to WASH MILL...

with  
a  
ONE  
MAN



## SAUERMAN SCRAPER

Using oyster shell from Mobile Bay and clay from the company's own deposit at West Baton Rouge, La., Ideal Cement's portland cement mill produces 6,000 barrels of cement per day. The clay, dumped by trucks into a soaking pit, is moved to the wash mill by a 2-cu. yd. Sauerman Scraper. Because of the nature of the material, the Crescent scraper bucket must be able to move freely from side to side of the pit in order to do a good job. This is accomplished by attaching the scraper cables to a monorail-trolley system at the front and rear of the soaking pit. The scraper handles 40 tons of clay per hour with a smoothness and economy of labor that further increases the overall efficiency of this mill.

Savings in labor costs, economy of operation, and rapid hauling are just three of the advantages provided by Sauerman Drag Scrapers. One machine — one man — efficiently controls the entire operation. Sauerman Scrapers have proved themselves in hundreds of applications all over the world. Better performance, less wear and maintenance mean more profits for you. Buckets range from  $\frac{1}{4}$  to 15 cubic yards. Gasoline, diesel, or electric powered.

Write for illustrated Catalog E, "Bulk Storage by Power Scraper" and "32 Tested Methods for Handling Bulk Materials." Sauerman Bros., Inc.,  
530 S. Clinton St., Chicago 7



ONE MAN  
MATERIALS HANDLING

**SAUERMAN BROS., INC.**

tion into oxygen containing kiln gas stream; (4) vaporization by the hot recirculating gas; (5) combustion initiation by the  $O_2$  of recirculating gas; (6) gasification of the vapors; (7) cracking of the heavier hydrocarbons; and (8) introduction into the kiln and to the air from the cooler.

The main aims are: (1) the proper gasifier state; (2) if gas is a white fog then temperature is too low; (3) if a brown-yellow gas, then it is the ideal combustible; (4) if a dark brown to black gas, then there is too high a gasifier temperature; (5) if a clear hot gas there is too much oxygen, tending to complete combustion with danger of damage; (6) the creation of a state that will rapidly vaporize the oil without impingement while still in liquid state particularly not on cold surfaces; (7) attainment of suitable gasification temperature through control of rate of recirculation gas flow, its oxygen content, atomizing pressure and atomizing temperature; (8) prevention of flooding through excess oil supply or carbonized tips, and prevention of excessive temperature through oil deficiency or excess oxygen delivery.

It is a very efficient system of gasification; the only source of radiation loss is from the recirculating duct which however is heavily insulated. This oil firing series is to be continued in several more parts.

### Joins 1000-Day Club

CANADA CEMENT Co's plant at Port Colborne, Ont., recently passed another milestone in accident prevention, joining the "1000-Day Club" of the portland cement industry. The plant has operated since May 15, 1951, without a lost-time accident, and has received the annual Portland Cement safety award ten times since 1925.

### Cement Company Sold

VALLEY FORGE CEMENT Co., Cata-sauqua, Penn., which operates a cement plant at West Conshohocken, Penn., has been acquired by Allentown Portland Cement Co., Catasauqua, which will operate the plant as the Valley Forge plant of Allentown Portland Cement Co.

## "CROSS" A HONEY OF A SCREEN - FOR HIGHEST EFFICIENCY • LONGER WEAR • ACCURATE SIZING

Look for this Stamp on all "Cross" Products



the Sign of PLUS QUALITY for PLUS PERFORMANCE

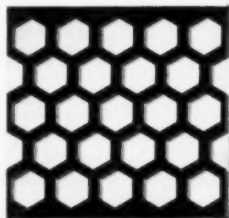
CROSS Perforated Steel Segments, Sections, Decks, and Parts for VIBRATING — SHAKING REVOLVING and other

TYPES OF MACHINERY

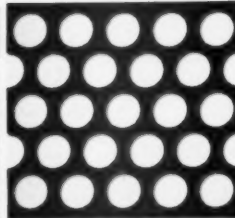
**CROSS ENGINEERING COMPANY**

Manufacturers • Carbondale, Penn. Telephone 300

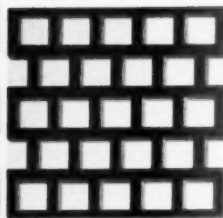
"CROSS" SERVICE AGENCIES in Principal Cities  
New York, N.Y. — 101 Park Ave. MUrray Hill 5-0253



CROSS HEXCREEN



CROSS ROUND



CROSS SQUARE

SERVICES OF "CROSS" FIELD ENGINEER AND TECHNICAL DATA ON REQUEST

# SIMPLE

# AS

Getting profitable life from castings which must face heavy abrasive service is simple as A B K.

ABK Metal castings stand up better and last longer because of carefully controlled metallic structure and specified hardness (500 to 700 Brinell). Because ABK Metal has those extra qualities that ordinary "abrasion resistant" metals lack, you can expect up to seven times greater service from ABK Metal castings.

The extra life of ABK Metal castings saves you dollars both in replacement parts and labor—cuts downtime, increases your operating efficiency. Let us show you how ABK Metal, an exclusive Brake Shoe product, can solve your abrasive wear problems.



2166



CHICAGO • HOUSTON • ST. LOUIS • SAN FRANCISCO • TOLEDO

**BRAKE SHOE AND CASTINGS DIVISION**

230 Park Avenue, New York 17, N. Y.

*FlexElex*



## ELECTRIC HEATING

**Offers Substantial Savings  
In Screening of Damp Materials**

Try the FlexElex equipped Leahy Screen on the most difficult damp screening you can find . . . screening such materials as lime, ag-lime or silica sand.

Leahy Differential Vibration *plus* FlexElex Electric Heating keeps your screens operating hour after hour, day after day at full capacity because the mesh stays wide open.

You get higher capacity, virtual elimination of idle time and longer screen life.

Send for Bulletin 15-J.

*Leahy*

**THE DEISTER CONCENTRATOR COMPANY**

*The Original Deister Co., Incorporated 1906*

915 Glasgow Avenue

Fort Wayne 3, Indiana

## Slurries...handled at lower cost

The new WILFLEY MODEL K Centrifugal Sand Pump embodies important mechanical improvements especially adapted to the handling of cement slurry and results in stepped-up production and substantial power savings. Individual engineering. Write for details.

**A. R. WILFLEY  
& SONS, Inc.**  
Denver, Colo., U.S.A.

New York Office: 1775 Broadway, N. Y. C.



**Buy WILFLEY  
for Cost-Saving  
Performance**

**WILFLEY**  
centrifugal PUMPS

**KEEP  
ABREAST  
WITH  
INDUSTRY  
TRENDS  
THROUGH  
ROCK  
PRODUCTS**

## Properly Limed Soil

*(Continued from page 125)*

The average of nine experiments on soybeans shows that lime increased the net return \$19 per acre above the return for 400 lb. of 0-10-20 without lime.

### Lime has Secondary Values

Although no sales program compares with one showing the large return for each dollar spent for the particular product, additional secondary values can be given to a good liming program.

Calcium and magnesium are required as a plant nutrient. Calcium particularly is also recognized as having a nutritional value in food and feed production.

Although hard to separate from the economic return, the better crop growth results in better protection of the soil, and higher land values as a result of better production.

### Soil Tests are the Best Index of Lime Needs

The need for liming is best established by a soil test in a reliable laboratory. Many states offer this free service to the farmers. A program of sales based on the need as shown by a soil test, and recommended by the Agricultural Experiment Station, appears sound, economical, and of benefit to everyone concerned. This challenge of proper liming for economical production cannot be overlooked by those in the industry or in public office.

Demonstrating the value of lime, fertilizers, varieties, etc. on the farmer's land is still one of the most effective means of bringing about economic changes. A few points to encourage the use of needed lime can be given:

1. Encourage farmers to have their soil tested.
2. Assist farmers with their soil samples.
3. Make equipment available for easy sampling, such as soil sampling tubes.
4. Offer to mail samples free to the Soil Testing Laboratory.
5. Check soil sample returns showing the need of lime and put out acre demonstrations.
6. Conduct field inspection tours of lime demonstrations.
7. Work with agricultural leaders to promote soil testing.
8. Believe in your product.
9. Know your product and be able to discuss all phases intelligently with the farmers.
10. Sell on the basis of need.

### Quarry Reopened

THE FRED TAYLOR stone quarry, Florence, Kan., which has been closed since 1918, has been leased and reopened by J. L. Wilson and Son, El-Dorado, Kan. Road stone, concrete aggregate, and agricultural limestone will be produced.

## NEW INCORPORATIONS

**Twin Cities Concrete Pipe Co., Inc.**, Pasco, Wash., was recently incorporated with an authorized capital of \$35,000. The incorporators are Frank H. Souther, Robert E. Jose and Mary Klug, all of Yakima, Wash.; William H. Souther, Sunnyside, Wash.; and Lawrence W. Slorah, Kennewick, Wash.

**Tobias, Wright & Birchenough, Inc.**, Lyons, Kan., has been incorporated with an authorized capital of \$75,000. The company will deal in sand and gravel. Ansel W. Tobias, Walter J. Wright and Donald L. Birchenough are the incorporators, with Mr. Birchenough also serving as resident agent.

**A-One Concrete, Inc.**, Wichita, Kan., has been granted a corporation charter for the production of ready-mixed concrete. Capitalization was listed at \$15,000. Thomas C. Rau is the resident agent.

**Architectural Cement Products, Inc.**, Columbus, Ohio, has been incorporated with 250 shares of no-par common stock. The incorporators are Harold H. Voelker, Thana Clay and Francis McNabb, with Mr. Voelker, as statutory agent.

**Delavan Sand and Gravel Co., Inc.**, Delavan, Wis., has been incorporated with 500 shares of stock, no par value. Minimum capital was listed at \$1000. The sole incorporator is Alois Zale.

**Boulder Gravel Products, Inc.**, Boulder, Colo., was recently incorporated by James G. and Mildred E. Milne and Harold H. Short.

**Sweeney Sand & Gravel Corp.**, Milwaukee, Wis., was recently incorporated with 200 shares of stock, \$100 par value. Samuel Goldenberg is the sole incorporator.

**Construction Service Co., Inc.**, Great Bend, Kan., has been incorporated to deal in ready-mixed concrete and other building products. Capitalization was listed at \$150,000. The incorporators are Victor E. and June E. Baum and B. L. Bissell.

**National Vermiculite Co., Inc.**, has been incorporated by J. T. Patterson, T. M. Patterson and W. A. Patterson, Lanford, S. C.

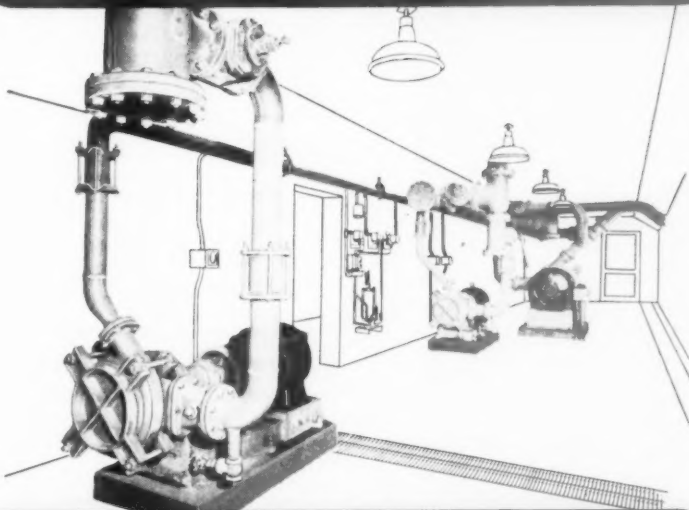
**Seneca Concrete Products Co.**, Bascom, Ohio, was recently incorporated by Wesley B., Maurice W., and Phyllis Shumway. Capitalization consists of 250 shares of no-par common stock.

**Winslow Sand & Gravel Co.**, Englewood, Colo., has been incorporated with \$50,000 capital. The incorporators and directors are Albert J. Gould, Lloyd H. Stormo and D. U. Alexander.

**Erie Nevada Silica Co.**, Las Vegas, Nev., was recently incorporated with \$100,000 capital.

**Holsam Concrete Products Co.**, Englewood, Colo., has been incorporated by Albert J. Gould, Lloyd H. Stormo

# Handles extremely thick slurries with high specific gravities



## MORRIS Type R SLURRY PUMP

Heavy viscous slurries with solids ratios as high as 70% by weight are not unusual loads for a Morris Type R Slurry Pump.

A case in point is this Morris installation at the Missouri Portland Cement Co., St. Louis, Mo. The two Morris 3R Pumps in the foreground each handle 200 GPM of a cement slurry at 64% solids with 1.66 specific gravity. Speed is 1180 RPM. The 6R Pump in the background handles 600 GPM of the same slurry at 880 RPM.

### Long operating life... little or no maintenance

Massive running parts of the Type R compensate for the increased load imposed by high specific gravities. Hydraulic passages are deliberately designed for high concentrations of solids—the result of careful study of wear patterns shown by pumps in the field handling all kinds of abrasive materials. Elimination of areas of throttling and turbulence assures uniform wear of all parts.

There are no internal studs or bolts—no troublesome internal joints and fits. The suction disc liner is merely *clamped* into position between disc and shell. The absence of high stress on the shell permits wide variations in its composition—including materials of high abrasive resistance—to resist wear and extend the operating life of the pump.

Let our engineers consult with you on your slurry pump problems. They'll give you the benefit of 88 years of pump-building experience. Or, write for Bulletin 181.

### MORRIS MACHINE WORKS

Baldwinsville, New York  
Sales Offices in Principal Cities

# MORRIS

## Centrifugal Pumps

## More Tonnage



## "Cape Ann" Forged Steel Drop Ball

Ruggedly designed and drop tested to insure maximum breakage. Lifting link protected by deep recess to minimize cable replacement. Adaptable for swivel or shackle.

Used by leading quarries for economical secondary breakage.

**2000 to 8000 lbs.**

**Prompt Shipments**

*For further information write—*

**Cape Ann Anchor &  
Forge Co.**

Post Office Box 360  
Gloucester, Mass.

and D. P. O'Dea, who also compose the board of directors. Capitalization was authorized at \$50,000.

**Southwest Chat Co., Inc.**, Baxter Springs, Kan., has been incorporated with \$10,000 capital. The incorporators are H. D. Youngman, C. Kenneth Underwood and Ray Adkins.

**Pre-Mixed Concrete, Inc.**, Wichita, Kan., was recently incorporated with \$15,000 capital. H. D. Richie is resident agent.

**Holston River Quarry, Inc.**, Marion, Va., was recently incorporated with \$50,000 capitalization. Stuart Ellis has been named president of the new company.

**Concrete Prestressed Corp.**, Bristol, Tenn., has been incorporated with 2000 shares of stock. Registered agent is Fred R. Garland.

**Atlas Ready-Mix Concrete Co.**, Las Vegas, Nev., has been incorporated with \$25,000 capital.

### Pipeline to Move Stone to Cement Plant

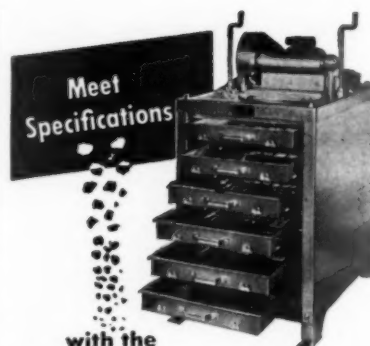
A PORTLAND CEMENT PLANT that will obtain its raw materials from a rock-conveying pipe line has been announced by Erle P. Halliburton, chairman, Halliburton Portland Cement Co. and Halliburton Oil Well Cementing Co., Corpus Christi, Texas. Plans call for a 100-mile, gravity-flow pipeline along the Verde River to carry a mixture of crushed limestone and water from quarries at Clarksburg to a proposed production plant at Phoenix, Ariz., 2400 ft. lower in altitude. The cost of thus sluicing the limestone was estimated at \$0.05 per bbl., as against \$0.50 per bbl. to ship finished cement. At present, portland cement for the rapidly expanding Phoenix area is shipped from the state's only cement plant in a limestone area near Tucson. Initial investment in the new project will be over \$1,000,000, while eventual investment in a new company to handle operations is expected to exceed \$5,000,000.

### Fluorspar Investigation

THE U. S. TARIFF COMMISSION recently began investigation into the import duty on the acid grade of fluorspar, containing more than 97 percent of calcium fluoride. The investigation is being carried out under Section 7 of the Trade Agreements Extension Act of 1951, as amended, and under Section 332 of the Tariff Act of 1930. This investigation reportedly was requested by Ozark-Mahoning Co., Tulsa, Okla.

### Gravel Plant Conversion

MALVERN GRAVEL Co., Malvern, Ark., recently announced the conversion of its sand and gravel dredging operation to a dragline operation. Trucks are used to haul the material from the dragline to the plant proper.



## Meet Specifications with the Gilson Testing Screen

The GILSON Screen cuts out error and guesswork in meeting sizing specifications for crushed stone, gravel, slag, coal, ores, and similar materials.

You can own and maintain a GILSON Screen for only 65-cents per 1,000-ton production in your plant, according to our sales and service records.

For Research Projects, too — the GILSON Screen is the answer to moderate-scale mass separation jobs.

#### WHY THE GILSON SCREEN?

1. Makes test quickly and accurately
2. Two to seven separations simultaneously
3. Screen trays independently removable
4. Trays balanced to same tare weight
5. Visible separation to refusal
6. Few moving parts
7. Sturdy construction
8. Size range 4" to 200-mesh

**GILSON SCREEN CO.**

BOX 186 • MERCER, PENNA.



In plants handling Cement, Lime, Gypsum, Sand, Gravel, Crushed Stone, etc. the WEIGHTOMETER is used for fast accurate production.

WEIGHTOMETER gives a continuous, automatic, and accurate weight record of materials in transit at an extremely low operating cost. All producers of bulk materials handled by belt conveyors need this dependable check on production figures supplied by MERRICK WEIGHTOMETER.

**Merrick Scale Mfg. Co.**  
Passaic, New Jersey

## MANUFACTURERS NEWS

**Olin Industries, Inc.**, East Alton, Ill., has announced the appointment of N. H. Collisson of Pisgah Forest, N.C., and M. F. Meissner of East Alton, Ill., as vice-presidents for operations. Mr. Meissner, who has been general manager of the metals division, will administer the arms and ammunition, explosives, ramset and metals divisions. He will also act as general manager of the metals division.

**General Electric Co.**, Syracuse, N.Y., has announced the following appointments: Robert L. Casselberry, manager of product planning and marketing research; L. Robert Sheeley, manager of sales; Horace N. McNeill, manager of product service; Theophilus Johnson, Jr., sales manager for carrier current equipment.

**Clark Equipment Co.**, Buchanan, Mich., has organized a Mobile Service School offering advanced training to personnel from dealer and customer organizations on maintenance and operation of fork trucks, towing tractors, Ross straddle carriers and materials handling equipment. The service school, which is currently touring the Midwest, Southwest and far West, will ultimately cover all 48 states.

**St. Regis Paper Co.**, New York, N.Y., announces that 20 representatives of its licensees from Norway,

Sweden, Germany, France, Belgium, Holland, England, Australia and Indonesia recently spent three weeks in the United States visiting St. Regis mills and plants, also cement plants where St. Regis packers and multi-wall paper bags are used.

**Clayton Mfg. Co.**, El Monte, Calif., announces that J. J. Billman, formerly sales manager of the steam generator division, has been appointed western division sales manager, with headquarters at the factory. H. M. Kirkby, who was sales promotion manager, has been named sales manager of the eastern division and will make his headquarters in Chicago.

**The Torrington Co.**, Torrington, Conn., has announced the sudden death on November 14 of Lester J. Ross, president of the company. He was 63 years old. Mr. Ross joined Torrington in 1913 and became secretary in 1930. He was named vice-president in 1939 and executive vice-president in 1944.

**Westinghouse Electric Corp.**, Pittsburgh, Penn., has appointed L. A. Kilgore as staff engineering manager for the East Pittsburgh divisions. He was formerly assistant manager of generator engineering for the transportation and generator division.

**The Colorado Fuel & Iron Corp.**, New York, N.Y., has organized a new department to coordinate and expand product research and development. It is a part of the executive department,

with headquarters at Washington, D.C., and will operate under the direction of Howard J. Davis, assistant to the president, in addition to his duties as Washington representative.

**Thor Power Tool Co.**, Aurora, Ill., announces the appointment of Ernest D. Fischer as manager of the branch office in Atlanta, Ga. He was formerly service engineer in the branch office in Jacksonville, Fla.

**Le Roi Co.**, Milwaukee, Wis., announces that Hugh M. Little has been named a vice-president and Norman J. Kimber has been promoted to works manager of the Milwaukee division.

**Fruehauf Trailer Co.**, Detroit, Mich., has opened a new manufacturing plant in Westfield, Mass. The plant was formerly owned by Brown Equipment Co.

**Pioneer Engineering Works, Inc.**, Minneapolis, Minn., has announced the appointment of A. J. Belanger as sales manager.

**Joy Mfg. Co.**, Pittsburgh, Penn., announces opening of a new district office in Cleveland, Ohio, to serve all of Ohio except the counties of Mahoning, Columbiana, Carroll, Tuscarawas, Coshocton, Muskingum, Perry, Hocking, Vinton, Jackson, Scioto, Lawrence, Gallia, Meigs, Athens, Washington, Morgan, Noble, Monroe, Guernsey, Belmont, Harrison and Jefferson. In addition to all of Michigan except the



**SAVE  $\frac{2}{3}$   
OF YOUR  
FUEL**

### ... WHEN YOU MAKE LIGHTWEIGHT AGGREGATE BY DWIGHT-LLOYD® SINTERING

You can save  $\frac{2}{3}$  of your fuel cost when you manufacture lightweight aggregate by the DWIGHT-LLOYD Sintering System.

Dwight-Lloyd sintering uses solid, carbonaceous fuel — only 4 to 10%, by weight, of the charge — far less fuel than required by any other process.

Dwight-Lloyd sintering machines offer many other advantages in manufacturing superior lightweight aggregate: *high output rate* — a 50' machine has a nominal capacity of 425 cubic yards per day; *continuous or intermittent operation* — without loss of efficiency, waste of material or stand-by and restarting costs; *a minimum of skilled labor* — is required for operation and maintenance. When greater output is required, the capacity of the machine can be increased up to 1000 cubic yards per day, at a fraction of the cost of a new machine.

Dwight-Lloyd, Inc., has complete facilities for designing and constructing your entire plant. We also offer the services of our modern pilot plant to test your materials.

For complete information write for Bulletin 151.

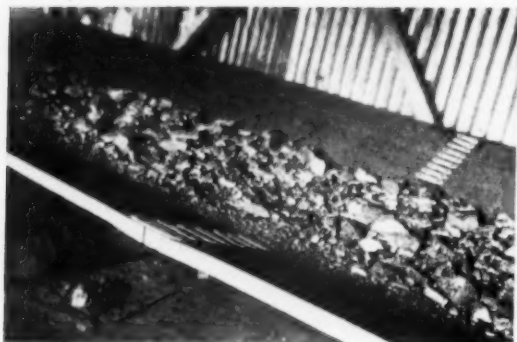
**DWIGHT-LLOYD, Inc.**

DIVISION OF SINTERING MACHINES CORPORATION

135 Sinter Avenue • Netcong, New Jersey



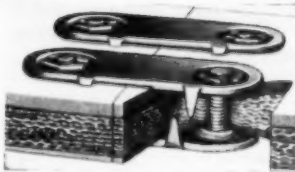
# FLEXCO



## BELT FASTENERS and RIP PLATES

FOR HEAVY  
CONVEYOR  
AND  
ELEVATOR  
BELTS OF  
ANY WIDTH

- ★ FLEXCO Fasteners make tight butt joints of great strength and durability.
- ★ Trough naturally, operate smoothly through take-up pulleys.
- ★ Distribute pull or tension uniformly.
- ★ Made of Steel, Monel, Stainless, Everdur. Also Promal top plates.
- ★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.



Compression Grip distributes strain over whole plate area

Order From Your Supply House. Ask for Bulletin F-100

**FLEXIBLE STEEL LACING CO.,**

4684 Lexington St., Chicago 44, Ill.

## Here's A 2-Cent Investment That Can Make Money For You!

Universal's new catalog No. 150 on Screens and Screening is just off the press. Write today for your copy!

### Latest Improved Models:

- Universal Vibrating Screens
- Unilec Electrically Heated Screens
- Uniflex Vibratory Screens
- Univibe Riddles



## UNIVERSAL VIBRATING SCREEN CO.

RACINE — WISCONSIN

upper Peninsula and the counties of St. Joseph, Kalamazoo, Van Buren, Cass and Berrien, the territory also includes northern Kentucky counties of Mason, Bracken, Pendleton, Campbell, Kenton, Boone, Gallatin, Carroll and Trimble.

The Moles, New York, N.Y., a society of leading figures in the heavy construction industry, announces that G. W. Maxon, president of the Maxon Construction Co., Dayton, Ohio, has been named one of two 1954 recipients of the awards given annually by the society for "outstanding achievement in construction."

The Colorado Fuel & Iron Corp., New York, N.Y., has re-elected all 11 members to the board of directors. In addition, Charles Roebing Tyson, executive vice-president of John A. Roebing's Sons Corp., has been elected a member of the board.

Hewitt-Robins, Inc., Stamford, Conn., has concluded an agreement with Greengate & Irwell, Manchester, England, to manufacture special types of conveyor belting and other heavy-duty industrial rubber products. A subsidiary, Hewitt-Robins (Great Britain) Ltd., has been formed to handle export sales from Great Britain. Greengate & Irwell will handle sales in the British Isles.

St. Paul Hydraulic Hoist, Minneapolis, Minn., has appointed the following distributors: Corts Commercial Body Works, Whitesboro, N. Y., in the area surrounding Utica, N. Y.; Timpte Brothers, Inc., Denver, Colo., in Colorado and Wyoming with the exception of eight northern counties; and Timpte Brothers, Inc., Albuquerque, N. M., in New Mexico with the exception of eight southern counties.

Internal Combustion Engine Institute, Chicago, Ill., announces that J. E. Heuser, engine division sales manager of Le Roi Co., Milwaukee, Wis., has been elected president of the Institute. Other officers are B. G. VanZee, Minneapolis-Moline Co., vice-president; H. W. Smith, Caterpillar Tractor Co., secretary; and J. D. Cook, Hercules Motor Corp., treasurer.

Atlas Powder Co., Wilmington, Del., has announced construction of a \$2,700,000 administrative headquarters building in Wilmington, which is expected to be completed early in 1955.

St. Regis Paper Co., New York, N.Y., announces the appointment of Arch Carswell as vice-president in charge of sales of all products of the company. He was formerly vice-president in charge of sales of the multi-wall packaging division.

Dynomatic Mfg. Co., Kenosha, Wis., effective January 1, became the Dynomatic division of Eaton Mfg. Co., Detroit, Mich.

United States Rubber Co., New York, N.Y., has announced the appointment of Henry E. Pruner as manager of conveyor and elevator

## MORE AND MORE CEMENT PLANTS USE BLAW-KNOX BUCKETS

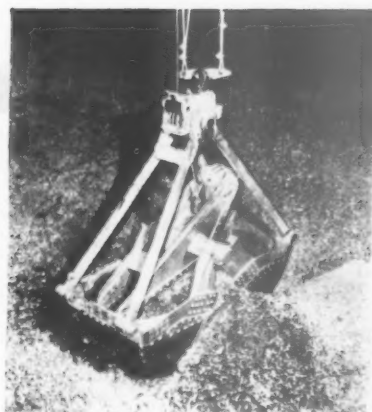
to meet the stepped-up requirements in handling  
CLAY • LIMESTONE • CEMENT CLINKER

Blaw-Knox bucket engineers have had many years of worldwide experience in the design and application of buckets for the cement industry.

This expert engineering service is available to you without obligation for the purpose of analyzing your operating problems and helping you select the proper size, weight and type bucket to meet your stepped-up requirements.

In all probability, we have already had experience in solving problems that may be puzzling you. Write for this free service.

Write for Bulletin 2378 for complete information, construction details and specifications.



Size 720-S rated 1 1/4 yd.  
BLAW-KNOX Bucket Handling Limestone and Clay.



## BLAW-KNOX CLAMSHELL BUCKETS FOR THE CEMENT INDUSTRY

BLAW-KNOX

**BLAW-KNOX COMPANY**  
BLAW-KNOX EQUIPMENT DIVISION  
Department 354  
PITTSBURGH 38, PA.  
Offices in Principal Cities

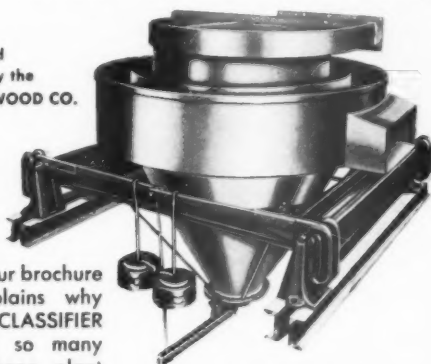
## This is the CONE TYPE



### AVORTEX CLASSIFIER...

...which is delivering the most exacting classifications in large or small tonnages in plants throughout the country.

Manufactured exclusively by the  
CHARLES E. WOOD CO.



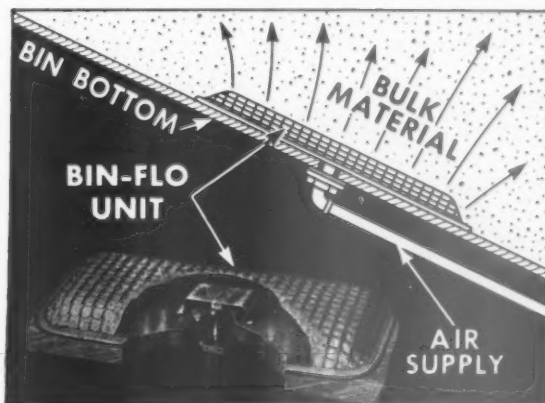
PATENTS PENDING

Write for our brochure which explains why this CONE CLASSIFIER has made so many friends among plant operators.



**CHARLES E. WOOD COMPANY**

906 NORTH WATER ST. • MILWAUKEE 2, WISCONSIN



## BIN-FLO

USES SMALL VOLUME  
OF AIR AT LOW  
PRESSURE

### KEEPS BULK MATERIALS MOVING

BIN-FLO units in bins, chutes, hoppers, etc., restore flow characteristics to dry, finely ground materials which tend to pack or bridge in storage. Types for all materials and conditions. No moving parts; simple installation; negligible operating cost; no maintenance cost.

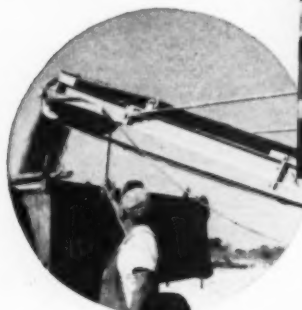
BIN-DICATOR bin level indicator—"The Eyes of the Bin"—automatically reports levels of materials in storage; automatically controls filling machines; prevents waste.

**THE BIN-DICATOR CO.**

13946-F Kercheval • Detroit 15, Mich.

NEW  
20-PAGE  
BOOK  
FREE

## MODERNIZE YOUR PLANT with Cedarapids-Schrock **MOTORIZED HEAD PULLEYS**



Here's a plant modernized with Motorized Head Pulleys that cut conveyor downtime up to 90% because all moving parts are inside the pulley shell! You save labor, too. On the installation shown at the left, the control switch enables the truck driver to pull up and load his own truck simply by pressing the button.

### HUNDREDS OF INDUSTRIES ARE REDUCING CONVEYOR DOWNTIME 70% to 90%

• NOW you can eliminate maintenance headaches on your belt or belt-bucket conveyor installations. With Cedarapids-Schrock Motorized Head Pulleys there are no chains, sprockets, sheaves out in the weather and dirt, no chain idlers to keep adjusted and oiled, no V-belts to adjust or replace, no shafts and drives to service or

lubricate. *There is no other pulley like it!*

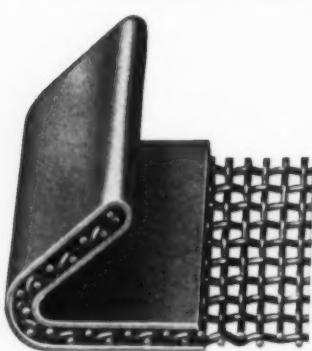
The next time you're down for weather, between jobs, or shut down for any reason, provide for future cuts in maintenance costs by modernizing your plant with *Motorized Head Pulleys*. Your Cedarapids distributor can give you the money-saving details.

Built for sale in Arizona, California, Nevada, New Mexico, Southern Oregon,  
Southwestern Utah and Texas by

**YUBA MANUFACTURING CO.** (Pulley and Sprocket Dept.) **Benicia, California**

**IOWA MANUFACTURING COMPANY, Cedar Rapids, Iowa, U.S.A.**

## Tyler Screen Sections for All Makes of Screening Machines!



Screen sections of Tyler Woven Wire are fabricated for all makes of vibrating screens in any mesh or metal. They are made up with hook-strip or bent-edge construction to suit the machine on which they are to be used.

Tyler hook-strips make possible stretching and maintaining the screening at drum-head tension, which is essential for successful screening and long screen life.

**THE W. S. TYLER COMPANY**  
CLEVELAND 14, OHIO

Manufacturers of Woven Wire Screens and Screening Machinery

belting sales of the mechanical goods division. He was formerly a sales engineer in the Chicago branch and succeeds George C. Crabtree, who has been appointed assistant district sales manager of the New York branch. Philip J. Guilfoil has been made manager of the Buffalo branch, and N. Walter Swenson, former assistant district sales manager in New York, succeeds William G. Mueller as manager of the Boston branch. Mr. Mueller has been given a special assignment in the New England area.

The Gene Olsen Corp., Adrian, Mich., has announced the appointment of Forest M. Cook as assistant sales manager. He was formerly a vice-president and sales manager of Stearns Mfg. Co. Charles Perkins was recently named eastern direct factory representative in Connecticut, Massachusetts, Rhode Island, Vermont, Maine, New Hampshire, southern New York and northern New Jersey. Charles Ector, former assistant sales manager and advertising manager of Fleming Mfg. Co., has been appointed southeastern representative in Tennessee, Alabama, Georgia and all of Florida except a few southern counties.

Joseph T. Ryerson & Son, Inc., Chicago, Ill., announces that Keith J. Evans has been appointed director of marketing and public relations in addition to his duties as advertising and sales promotion manager in charge of market research, sales analysis, sales promotion, advertising and public relations. Lowell M. Bennett, formerly in charge of sales promotion, has been named advertising and sales promotion manager.

E. J. Longyear Co., Minneapolis, Minn., has opened a new sales office in New York, N. Y., under the management of Stewart G. Richmond. Walter R. Eastman is branch manager of the office and warehouse in Salt Lake City, Utah, and John H. Bimson is in charge of the office in Minneapolis. Ray Lueff, who has been appointed field engineer for the sales division, is also a consultant in diamond drilling problems.

Pioneer Engineering Works, Inc., Minneapolis, Minn., announces that Joe Hanratty, consultant for government sales, has retired after 25 years of service with the company.

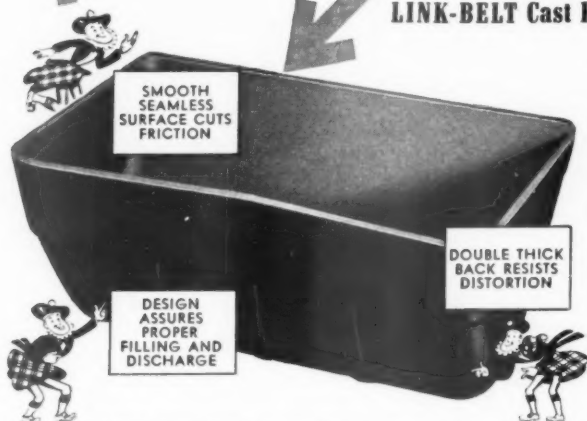
Robertshaw-Fulton Controls Co., Philadelphia, Penn., announces the appointment of Robert O'Hara as sales engineer of the Fielden instrument division.

Osgood-General, Marion, Ohio, has appointed the West Coast Engine & Equipment Co., Berkeley, Calif., as distributor for the San Francisco and northern California area and the southern counties of Oregon.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces the death on December 4 of R. F. Feind, special engineer in the processing machinery department. He was 64 years of age.

## Here are buckets tailored for rough, tough elevator service

**LINK-BELT Cast Buckets pay dividends in longer life, cleaner handling**



**LINK-BELT COMPANY:** Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities.

**Y**ES, Link-Belt Cast Buckets are durable. Made of the highest grade malleable iron or Promal (the stronger, longer wearing metal)—they resist abrasion and corrosion . . . stand up better under day-in, day-out usage. Improved casting methods assure uniformity. And special construction features help build their reputation for improved performance.

Find out how Link-Belt Cast Buckets can save you money. There are many styles and sizes available for a wide range of applications . . . for either chain or belt mounting. Steel buckets of various designs are also furnished. Call your Link-Belt sales representative or distributor for local stocks and information.

**LINK-BELT**  
CAST ELEVATOR BUCKETS

13,216

## "ORIENTED DIAMONDS" MAKE SPRAGUE & HENWOOD BITS CUT FASTER—LAST LONGER

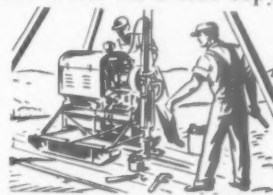
Always a leader in its field, Sprague & Henwood, Inc. PIONEERED the development of ORIENTED Diamond Bits: in which each individual diamond is set with its hardest rib or "vector" toward the work. We have produced THOUSANDS of oriented bits, in a wide variety of types and sizes, with both cast and powdered-metal matrices; and have proved, by extensive comparative tests in our own contract drilling operations, that they cut much faster and last much longer than bits in which the diamonds are set at random.

Only selected diamonds of certain crystalline structure can be used and only specially trained and equipped setters of more than usual aptitude can be relied upon to orient diamonds correctly in the mold, but we are now fully organized for efficient production of ORIENTED DIAMOND BITS, at no additional cost to the purchaser.

In terms of footage cost, these are the most economical diamond bits ever produced and we invite inquiries on that basis. Bulletin No. 320 illustrates and describes all types and gives complete data. Write for a free copy.

### CONTRACT DRILLING

We do drilling by contract and are one of the oldest and largest contractors for any type of core drilling. Experienced crews and supervisors are available for service anywhere in the United States and many other countries. Estimates on request.



**SPRAGUE & HENWOOD, Inc., Scranton 2, Pa.**

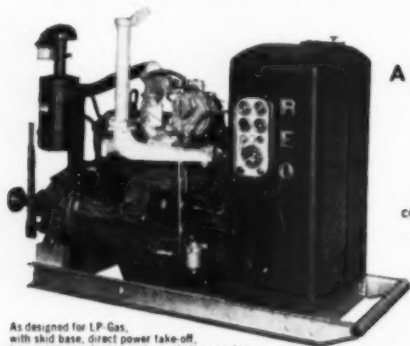
Branch Offices: New York • Philadelphia • Pittsburgh • Grand Junction, Col. • Buchans, Newfoundland

# REO INDUSTRIAL POWER

## is Performance-Inspected

Each new Reo Industrial Engine is carefully inspected on-the-job just before it goes into service, and—again—after a month of operation. Whether purchased as an individual unit or in an assembled machine, we make doubly sure all users get the fine performance Reos are built to deliver.

World-famous Reo spark-ignition engine design has been skillfully adapted for every need from 50 to 180 continuous horsepower. Gasoline. Natural gas. Liquefied petroleum gas. Dual-fuel combinations. For heavy-duty features and low operating costs, depend on Reo reliability. Write for specification and name of nearest dealer.



As designed for L.P. Gas, with skid base, direct power take-off, heavy-duty air cleaner, and visual alarm system with automatic shutdown.

### A VERSATILE, RUGGED "PACKAGE"

Efficient combustion from Reo overhead valves . . . seven main bearings for long-lasting smooth operation, with interchangeable inserts for simple low-cost repair . . . integral oil cooler; full-flow oil filter; large-capacity oil pump; positive crankcase ventilation; fully controlled by-pass cooling system. Reo wet sleeve design allows rebuilding to "as manufactured" tolerances and clearances, and permits cleaning of water jacket to maintain desired rates of heat transfer from valves, pistons, and rings. Basic units and supplementary equipment for every application.

INDUSTRIAL ENGINE DIVISION **REO MOTORS, INC.** LANSING 20, MICHIGAN

# PYRASTEEL

## SEGMENTAL KILN ENDS FOR CEMENT PLANTS

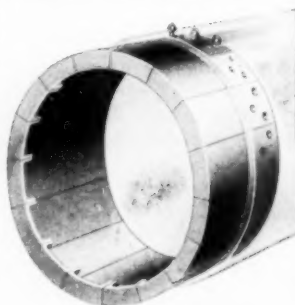
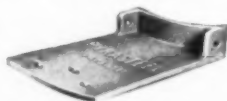
. . . proven satisfactory in THOUSANDS of Installations

Avoid burnouts and shutdowns, and insure years of continuous service, by equipping your kilns, both feed and discharge ends, with PYRASTEEL Segmental Kiln Ends.

PYRASTEEL is equally effective and economical in many other high-heat applications, including clinker coolers, conveyor screws, feed pipes, and drag chains.

Over three-quarters of the annual cement output is produced in plants using either or both of our alloys, PYRASTEEL and EVANSTEEL.

Unit Segments are easy to install or replace



**PYRASTEEL KILN END,**  
Discharge end

Write for PYRASTEEL Bulletin

**CHICAGO STEEL FOUNDRY CO.**

Kedzie Avenue and 37th Street • Chicago 32, Illinois

Makers of Alloy Steel for Over 40 Years

Mr. Feind, who joined the company in 1909, designed cement manufacturing and crushing plant machinery, including the largest crusher built by Allis-Chalmers.

Clark Equipment Co., Benton Harbor, Mich., has appointed the following distributors: Berry Bros. Machinery Co., Dallas, Texas; Furnival Machinery Co., Harrisburg, Penn.; Henry H. Meyer Co., Inc., Baltimore, Md., and George P. Williams Co., Cleveland, Ohio.

Food Machinery & Chemical Corp., New York, N.Y., announced that Louis Neuberg has been appointed vice-president of the chemical divisions.

Twin Disc Clutch Co., Racine, Wis., has announced the appointment of Jack N. Yetter as manager of sales promotion, with headquarters at Racine. He was formerly manager of the Tulsa, Okla., district and will be succeeded in this position by Mel H. Woodward.

Alloy Rods Co., York, Penn., recently dedicated its new Pacific Coast division manufacturing plant in El Segundo, Calif. George M. Hohmann is plant manager of the new plant which is designed as a custom plant to care for alloy welding electrode needs.

Cummins Engine Co., Inc., Columbus, Ind., has placed in operation the new 300-ft. conveyor-type production line which is part of its \$7 million post-war expansion program. Assembly operations on this line are conducted in a new air-conditioned and dust-proof building.

American Steel Dredge Co., Inc., Fort Wayne, Ind., announces that Walter W. Walb, president, has been elected vice-president of the Power Crane and Shovel Association.

General Electric Co., Schenectady, N.Y., announces that Charles B. Elledge, manager of materials handling industries sales, has been elected president of The Material Handling Institute, Inc., for 1954.

Morse Chain Co., Detroit, Mich., has announced completion of a \$1,400,000 modernization and expansion program in the Ithaca, N.Y., power transmission chain manufacturing plant.

Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, Ohio, has appointed F. Doyle Bowers as southern district manager in Jackson, Miss., Chattanooga, Tenn., and Columbia, S.C., with headquarters in Atlanta, Ga.

H. K. Porter Co., Inc., Pittsburgh, Penn., has announced acquisition of The Alloy Metal Wire Co., Prospect Park, Penn., which will be operated as a division of the company.

Bailey Meter Co., Cleveland, Ohio, has moved its Boston, Mass., district office to 230 Congress St. P. T. Reuter is manager of the office.

# BAUGHMAN LIME and FERTILIZER SPREADER

*with the New Ground Drive  
for Uniform Spread . . . at Higher Speeds*



Backed By More Than 20  
Years of Specialized Experi-  
ence in the Development of  
Spreading Equipment.  
WRITE for Bulletin No. A-378



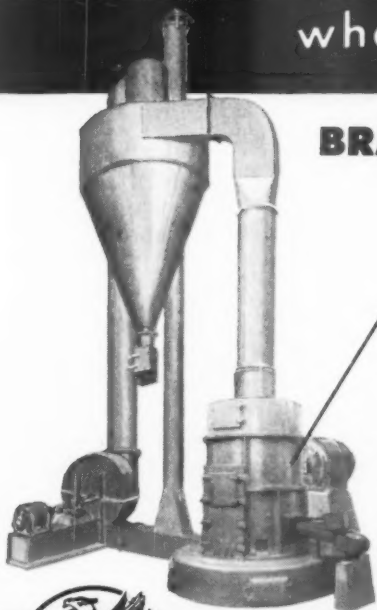
**BAUGHMAN Manufacturing Company, Inc.**

124 ARCH STREET

JERSEYVILLE, ILL.

**BAUGHMAN—The First Choice of Over 60,000 Users!**

when *fine* grind is desired



## BRADLEY PNEUMATIC HERCULES MILL

**The ONLY pneumatic roller mill  
installed at floor level.**

Designed and constructed for FINE grinding of limestone, phosphate rocks, insecticides, other similar materials . . . Bradley Pneumatic Hercules Mill produces a uniform grind from 20 to 325 mesh. Floor level installation provides easy accessibility . . . lowest installation and maintenance cost. Durable, non-clogging vibratory feeder for dependable, worry-free operation . . . even on materials with some amount of moisture.

For complete information, write for Catalog No. 62



# Bradley PULVERIZER CO.

LONDON ALLENTOWN, PENNA. BOSTON

# SELECT-O-WEIGH

(ELECTRONIC WEIGHT CONTROL)

Remote, Instantaneous, Dial-Control  
Formula Changing and Ingredient Selection

For PROPORTIONING Applications

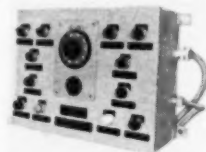
Select-O-Weigh, Richardson's electronic weight control system, reduces the most complex formula-changing and ingredient-selection problem to push-button simplicity. For with Select-O-Weigh you select, measure, and deliver up to twelve ingredients from a single, pre-set, remote-automatic control panel.

Through incorporation of a simple, fool-proof electronic circuit, Select-O-Weigh changes formulas *instantly*, with the setting of a dial—no sliding poise adjustments or manual weight changing. And a single, automatic scale handles many ingredients—up to twelve or more.

Select-O-Weigh is designed for either cumulative or consecutive weighing, and can be used with many existing automatic scales.



Control panel for Select-O-Weigh handling constantly varying amounts of a single material. Weight desired is set on control dial, and compensation on smaller vernier knob below it. Multiple control dials for multiple ingredients.



Richardson E-50 Automatic Bulk Scale set up for operation with the Select-O-Weigh. Discharge from E-50 would be through hopper to next operation on floor below.

Batch hopper capacity to suit

The Richardson Scale Company, Clifton, N. J., will be glad to supply information on:

Ticket or tape printing as required. Additional remote indicator dials (optional) interlocked with Select-O-Weigh dial as remote followers for convenient location of control. Tare check circuit for zero empty balance double-checks accuracy. Interlocks with conveyors, mixers, and other allied equipment.

Please write direct to our Clifton office, or to the nearest of our branch offices, located in Atlanta, Boston, Detroit, Minneapolis, Wichita, Montreal, Omaha, New York, Pittsburgh, San Francisco, Toronto, Buffalo, Chicago, Philadelphia, Houston.



## Richardson

MATERIALS HANDLING BY WEIGHT SINCE 1902

SP 8300

Write for Select-O-Weigh Bulletin #0351.

## Feed Mill Hammers Built Up with RESISTO-LOY

last 12 times as long ...  
grind 36 times  
as much Alfalfa

This is but one type of hammer used in feed mills. Size 4 x 1 3/4 x 1/8 inches.

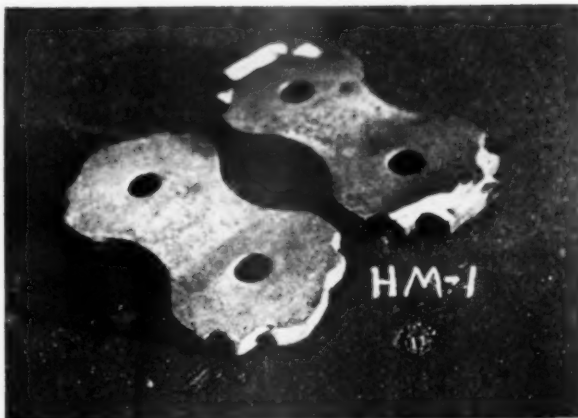
These hammers are usually made of tool steel and grind efficiently only when the corners are sharp and squared.

Untreated hammers grinding alfalfa lasted 6 hours. Hammers treated with a non-ferrous hard-surfacing lasted 16 hours.

Hammers built up with RESISTO-LOY lasted 72 hours and ground 36 times as much material as the untreated hammers because the corners and steps remained sharp and square.

Labor, material and overhead costs on the above hammers less than 10 cents each.

Call in our field man for comparable savings on your equipment.



## RESISTO-LOY CO. Manufacturers, Grand Rapids 7, Michigan

# CONCRETE PRODUCTS

A SECTION OF ROCK PRODUCTS

CONCRETE UNITS · READY-MIXED CONCRETE

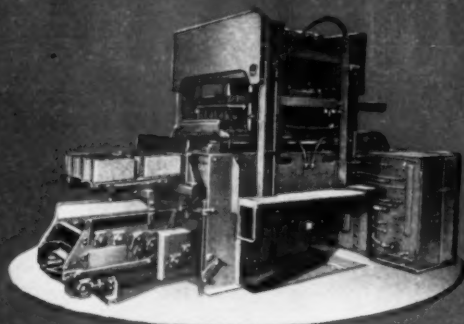


Modern plant of Gray Concrete Pipe Co., Inc., recently completed at Hagerstown, Md.

# 6 REASONS FOR GOCORP LEADERSHIP

So brand new we had no photograph for this ad, here's another major GOCORP development that will save labor and dollars for YOU.

**THE "RACK-MAN"** eliminates your offbearing operation completely. Production is no longer limited by human factors. Rack-Man automatically takes the production from your block machine and indexes it into your rack. Also, empty pallets are automatically removed from rack and fed to the block machine.



**THE "KING"**—6 eight-inch equivalents per cycle. Conservatively rated at 3 1/4 cycles per minute. With the plain pallet, hydraulic driven "King" you get top quality, top production and low unit cost.

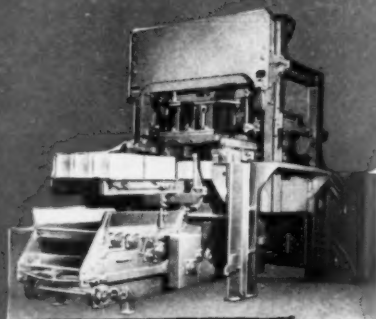
## NOW YOU CAN MODERNIZE

Here's an outline of another GOCORP block machine called the "Trustee" because it protects the heavy investment many block plants now have in mold equipment and vibration motors. The "Trustee" will accommodate those items that were acquired for use on the older machine, yet give you the advantages of a modern hydraulic block machine—better quality, lower maintenance, equal or higher production.

**THE "TRUSTEE"**—Three 8" blocks on plain pallets—four or more cycles per minute—front pallet feed.

## THE "SENIOR"

This plain pallet machine produces three top grade eight-inch equivalent blocks per cycle—4 or more cycles per minute. The smooth hydraulic drive, directional vibration, and sequence operation mean more profits for you at the end of the year.



## THE "JUNIOR"

Low cost, cored pallet machine. The "Junior" Single produces one, the Twin produces two eight-inch equivalents per cycle, 3 to 4 cycles per minute. Either "Junior" gives you real economy with modern hydraulic drive and sequence operation.



**THE BIG "73"**—73 cu. ft. of concrete per batch. Five other GOCORP Batch Mixer models from 12 to 50 cu. ft. capacity.

**OTHER COST CUTTING GOCORP EQUIPMENT**  
Block Cubers—boom or crane type • Skip Loaders—sizes to correspond with mixers  
Magnetic Offbearing Hoists • Attachments and improved Replacement Parts.

**ALSO AVAILABLE**  
Forney Testing Machines • Lift Trucks • Racks  
Pallets • Other Supporting Equipment.

**G-O-CORP**  
**ADRIAN-MICH.**

407 Grace Street

Adrian, Michigan

# Your Profit Starts With the First Cut!



... and  
**FREE TRIAL**  
Guarantees  
it!...

**MADE BY THE ORIGINATORS!**

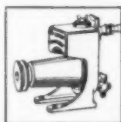
Clipper made the World's FIRST Masonry Saw nearly 20 years ago... still makes the World's FINEST Saws and Blades for every Masonry and Concrete cutting job

**OTHER PATENTED  
CLIPPER FEATURES**



**PRESSURE EQUALIZER**

Cushions pressure, cutting hard or soft materials. Gives fast cuts and long blade life.



**WET or DRY PUMP**

Factory Sealed Pump changes Dry Cutting to Wet by turning a valve. Needs no maintenance—no belts to remove.



LOOK FOR THE  
BRIGHT ORANGE COLOR  
AND THE  
TRADE-MARK CLIPPER!

MODEL NO.  
ONE OF 15 MODELS  
PRICED FROM \$265

**LOOK for the  
NOTCHES  
AND THE BRIGHT  
ORANGE COLOR**

**Clipper**  
SIMPLE in operation  
RUGGED in construction  
DEPENDABLE in performance

BE SURE — BUY CLIPPER! Patented "SELECT-A-NOTCH" gives instant, positive height adjustment for cutting Quarry Tile, Concrete Block or Stone. Clipper's exclusive deep-seating NOTCHES guarantee true Cutting Head alignment—for maximum blade life... increased production.

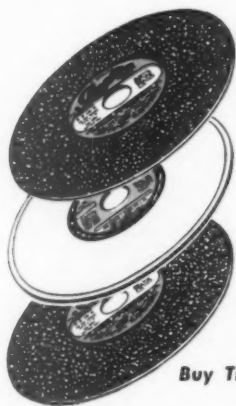
**You Can Depend On  
CLIPPER BLADES  
for CONSISTENT QUALITY  
From Rim to Stub!**

**SPECIFY GENUINE CLIPPER**—and take the gamble out of Blade buying! Nearly 20 years of field and laboratory research PLUS rigid manufacturing controls is your assurance of Consistent Quality in every genuine Clipper Blade. A complete range of specifications for low cost, faster cuts in all types of Masonry Materials, Asphalt and Concrete.

**Clipper "Wet" or "Dry" Abrasive Blades**  
**Clipper Diamond Blades**

**Clipper Break-Resistant (CBR) Blades**

**Buy Them By The Case for Greater Savings!**



**4 OUT OF 5 BUY CLIPPER**

**WRITE TODAY FOR FREE ILLUSTRATED LITERATURE**  
**CLIPPER MANUFACTURING CO.**  
2807 S. W. WARWICK KANSAS CITY 8, MISSOURI

• PHILADELPHIA  
• ST. LOUIS  
• CLEVELAND  
• DETROIT  
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• ATLANTA  
• WASHINGTON, D.C.  
• BIRMINGHAM  
• CHARLOTTE, N. C.  
• DALLAS  
• SEATTLE

**FACTORIES IN ENGLAND AND FRANCE**

**Saw CONCRETE or ASPHALT  
with the new...**



**SAW BEFORE BREAKING**—and save up to 50% in labor and materials with the new Power Driven ConSaw-Matic. Saw repair patches—gas, water, and air line trenches in floors, streets, walks, runways and highways. Save MORE by cutting contraction joints—eliminate costly hand forming and spalling. 5 MODELS, GAS OR ELECTRIC POWERED



Model C-130

**SAME-DAY SERVICE  
DIRECT FROM NATION-WIDE  
FACTORY BRANCHES**

**FREE  
TRIAL**

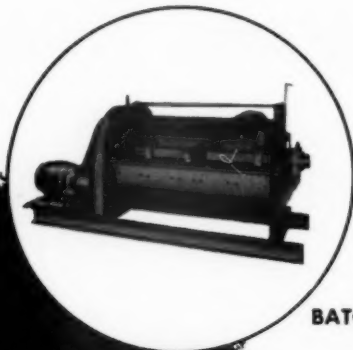


Your ONLY Guarantee  
of Complete Satisfaction—  
Actual on-the-job test!

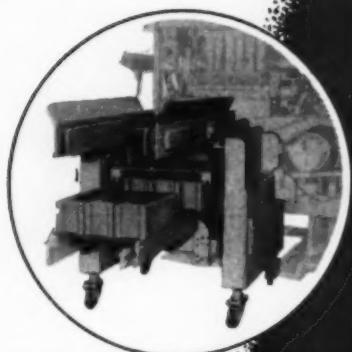
No. 102.



PALLET CLEANER



BATCH MIXER



FRONT PALLET RETURN

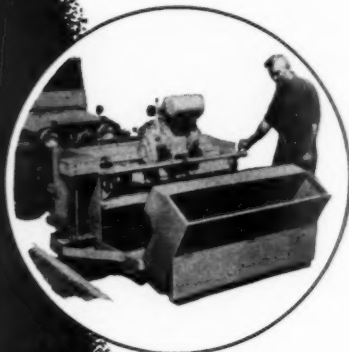
**BERGEN**

*Precision  
Made*

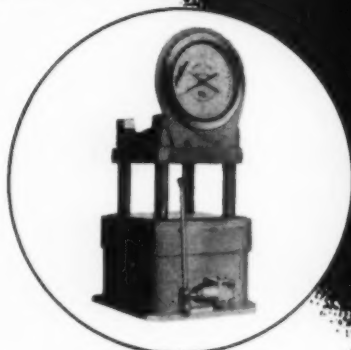
**EQUIPMENT**

*for the*

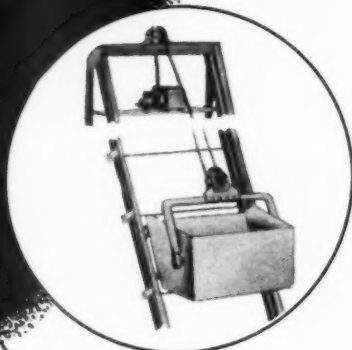
**CONCRETE  
PRODUCTS  
INDUSTRY**



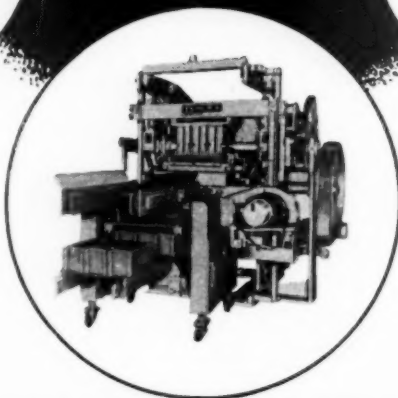
SWEEPER



BLOCK TESTER



SKIP HOIST



HIGH PRODUCTION BLOCK MACHINE

Write for literature and prices or phone "Collect" . . . NUTLEY (N. J.) 2-7300

**BERGEN MACHINE & TOOL CO., INC.**

189 FRANKLIN AVENUE  
NUTLEY, NEW JERSEY

# INDUSTRY NEWS

## Concrete Products Plant

EVANS PIPE CO., Uhrichsville, Ohio, recently announced plans to build a \$400,000 plant at Columbus, Ohio, for the production of concrete pipe and other concrete products. The company, which operates four plants in Uhrichsville, was founded 48 years ago by the grandfather of the present president, Thomas J. Evans, III. Secretary of the firm is M. J. Crites. According to President Evans, the Columbus plant is intended to provide a speedier service for a growing business in central Ohio. Much of the output will go into highway construction and other public works in Franklin and nearby counties.

## Concrete Panels in Blast-Wall Construction

THE MARIETTA CONCRETE CORP., Marietta, Ohio, recently supplied 5-in. precast concrete panels for the jet aircraft plant of North American Aviation, Inc., Columbus, Ohio, for use in a blast-wall assembly used in the pre-flight testing of the aircraft. This unique installation is believed to be the first of its kind.

Rows of blast walls were erected across the test area. Triangular in cross-section, the barriers consist of heavy timber or steel framing secured to a concrete apron. The precast concrete wall panels, identical with those used in industrial building construction, are bolted to the frame. Completed aircraft are wheeled into position in rows with the tailpipes facing the blast wall, as shown in the illustration. Engine test runs can thus be accomplished without danger to personnel or other aircraft.

The concrete panels, even though exposed to severe conditions of flame erosion and reverberatory vibration, have reportedly withstood successfully the full force and high temperatures of the jet blasts. The planes are usu-

ally located 20 ft. from the blast wall. The concrete panels were made of Marietta's own lightweight aggregate, Beslite, said to be especially suitable for use in concrete mixes which must withstand severe temperatures.

## Imitation Flagstone Block

GLENN DAVIS of Phoenix, Ariz., has developed a method of giving a flagstone surface texture to concrete block. He cuts flagstone into various shapes, lays the pieces in a pattern, and spreads a synthetic rubber over them. When the material hardens, it is a flexible mold with the surface texture of the original stone. The mold is then put in a press and various shapes of tinted concrete poured into the sections. A concrete block form on top of the mold is then filled with ready-mixed concrete, resulting in a precast section of eight or nine facsimile flagstones with lapped ends.

## Cover Picture

ON THIS MONTH'S COVER is an illustration of the new concrete pipe plant of Gray Concrete Pipe Co. at Hagerstown, Md., which replaces an old plant. The new plant was built at a new location to provide rail connections and better shipping conditions. Work was completed in the Fall of 1953.

## Holds "Open-House"

UNIVERSAL CONCRETE PIPE CO., Columbus, Ohio, recently held "open-house" at its new concrete pipe plant at Los Angeles, Calif. Over 500 engineers, contractors, architects and civic officials were guests at the plant. Grover M. Hermann, chairman of the board of American-Marietta Co., which owns a controlling interest in Universal, was one of the hosts. Other hosts included Henry Weigand, manager of the plant, and Chris Adzovich, production manager.

DISHMAN CONCRETE PRODUCTS CO., Spokane, Wash., has been granted a franchise to produce cast concrete fence posts. Grantor of the franchise is Permanent Post Corp., Spokane, a newly formed company, with J. D. Collier, inventor of the concrete fence post casting machine, as president. Other franchises are expected to be granted soon. Capacity of the new machine is about 900 concrete posts per day.

THE MARIETTA CONCRETE CORP., Marietta, Ohio, has purchased The Concrete Manufacturing & Supply Co., Nashville, Tenn., producer of concrete block and other concrete products. Marietta's line of farm silos, industrial storage bins and other concrete products will be added to the Nashville plant's production. Robert D. Johnson has been named general manager of the Nashville operation.

HWYWAY CONCRETE PIPE CO., Findlay, Ohio, was recently organized for the production of concrete sewer pipe, both plain and reinforced, and the larger sizes of concrete drain tile. John M. Stough, president and general manager, stated that the company plans primarily to serve state highway and county projects in northern Ohio, as well as in Michigan and Indiana.

THE TEXAS READY-MIX CONCRETE ASSOCIATION has reported a 13 percent increase in the 1953 Texas production of ready-mixed concrete, over that reported for 1952. Approximately 40 percent of all concrete used in construction in Texas last year was produced by ready-mixed concrete firms.

SCHULZ CONCRETE PRODUCTS, INC., Neenah, Wis., was recently incorporated with 2500 shares of stock, \$10 par value each. Gaylord C. Loehning is the sole incorporator and registered agent.

TUNNELL BUILDING AND SUPPLY CO., Kingsville, Texas, has purchased the plant and equipment of Kingsville Block Co., also of Kingsville. Capacity of the plant is 1500 lightweight block per day.

W. T. LISTON CO., Harlingen, Texas, has opened a ready-mixed concrete plant adjacent to its concrete pipe plant just west of Harlingen. R. T. Hawkins has been named manager of the new plant.

BUILDERS BLOCK CO., Walla Walla, Wash., recently began operations at its new plant at Walla Walla for the production of expanded lightweight shale products.

EL CERRITO BUILDING MATERIALS CO. has started construction of a concrete batching plant at Richmond, Calif.

UNIVERSAL CONCRETE PIPE CO., Columbus, Ohio, has announced a \$150,000 expansion program at its Columbus plant.



Blast wall, for use in pre-flight testing of jet aircraft, consists of 5-in. precast concrete panels, bolted to heavy timber or steel framing secured to concrete aprons

Industry standards guarantee a truck mixer with this rating plate to mix  $4\frac{1}{2}$  cubic yards.



*With this new rating plate, the same truck mixer is guaranteed to mix 5 cubic yards.*



## New rating plates, on old truck mixers, guarantee $\frac{1}{2}$ cu. yd. more mixing capacity

Revised standards of the Truck Mixer Manufacturers Bureau now provide that standard truck mixers of  $2\frac{1}{2}$  cubic yards or larger size shall be guaranteed by the manufacturer to mix an additional one-half cubic yard over their rated capacity.

This increase in capacity, approved with correlated specifications in the new standards of the National Ready Mixed Concrete Association, is immediately applicable to truck mixers in the field larger than  $2\frac{1}{2}$  cubic yards which are

now eligible to carry rating plates. The guarantee is conditional, however, on the attachment of the new rating plates.

To obtain the new rating plates, owners need only return their original plates to the Bureau with \$3 fee for each re-rating plate to be issued.

Users of ready-mixed concrete, who benefit by increased deliveries from re-rated truck mixers, may bring this to the attention of any concrete supplier who is

now ineligible to make this service improvement because of out-of-date rating plates.

We will gladly mail a composite copy of the new ASTM, NRMCA and Bureau standards to all architects and engineers who wish to maintain these quality standards by writing them into their own ready mixed concrete specifications. Address requests to the TRUCK MIXER MANUFACTURERS BUREAU, 1325 E. Street, N. W., Washington 4, D. C.

### Member Companies

**BLAW-KNOX EQUIPMENT DIVISION**  
Pittsburgh, Pa.  
**CHAIN BELT COMPANY**  
Milwaukee, Wis.  
**CHALLENGE MANUFACTURING CO.**  
Los Angeles, Calif.

**CONCRETE TRANSPORT MIXER CO.**  
St. Louis, Mo.  
**CONSTRUCTION MACHINERY CO.**  
Waterloo, Iowa  
**IMPERIAL CONSTRUCTION EQUIPMENT CO.**  
Melrose Park, Ill.

**THE JAEGER MACHINE COMPANY**  
Columbus, Ohio  
**THE T. L. SMITH COMPANY**  
Milwaukee, Wis.  
**WORTHINGTON CORPORATION**  
Plainfield, N. J.



YOU **CAN** COUNT YOUR  
READY MIXED PROFITS  
*before they're hatched*  
...if you plan with the  
Butler Engineer



Every Ready Mixed Concrete Plant is an individual and complex problem. It involves much more than the Plant itself. As examples:

**SITE** (The BUTLER Engineer is widely experienced in zoning, adverse traffic concentrations and yard-mile costs.)

**TERRAIN** (The Butler Engineer can decide whether or not ramp-loading is advantageous. How to use terrain for conveyor and stock pile economies.)

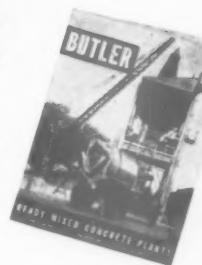
**MARKET** (The BUTLER Engineer knows how to appraise the market potential.)

And all of these factors govern the Ready-Mixed Plant itself . . . Shall it be automatic or manual? . . . Shall it be transit or central mix? . . . How big a mixer . . . And a host of other questions! But the point is:

You **CAN** count your profits before they're hatched . . . if you'll call in the BUTLER Engineer.

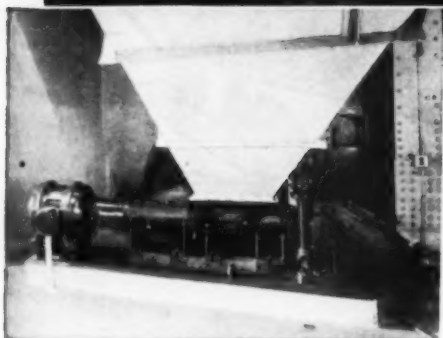
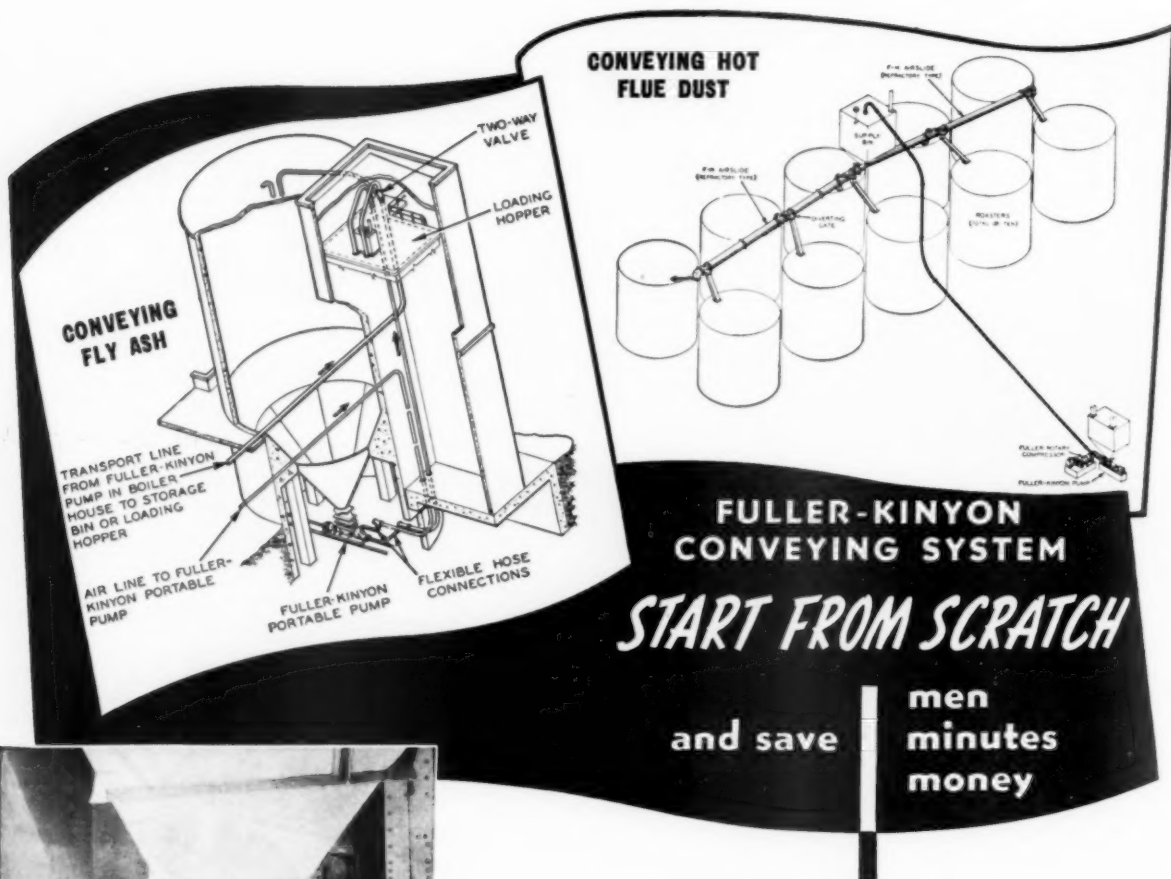


Bulletin 185 is like a FREE trip all over the country to inspect BUTLER Ready Mixed Plants. You'll find plants of every size, plants that meet a variety of conditions. It's a good preliminary to a consultation with the BUTLER Engineer — Send for it — today.



**BUTLER BIN CO.**

993 Blackstone Ave.  
WAUKESHA, WISCONSIN



Fuller-Kinyon System handling fly ash in a large central-generating station, from boilers to storage, storage to loading hopper. See drawing upper left.



Fuller-Kinyon System handling hot flue dust from Cottrell precipitator collecting hoppers to supply bin. F-H Airslides convey and distribute uniformly to roasters. See drawing upper right.

The best way to solve any problem of conveying dry pulverized materials is to "Start from Scratch." Get all the facts on pneumatic conveying systems while you are still in the planning stage ... either when building a new plant or modernizing an old one. Pneumatic conveyors permit economy and convenience in location of buildings and production equipment without the restrictions or straight-line limitations of mechanical conveyors. The layout of the system can be designed to meet the specific requirements of the job, to conform exactly to local conditions, to insure minimum cost for erection, maintenance, and supervision.

Right there is where Fuller comes into the picture. As engineers and builders of four basic types of pneumatic conveying systems, Fuller is able to provide the exact system best suited to individual requirements. Shown are two Fuller-Kinyon Conveying Systems—one for handling fly ash from boilers, the other for hot flue dust from Cottrell precipitators.

Fuller-Kinyon Systems have many advantages: conveying lines can be located anywhere—underground; suspended on simple hangers overhead; vertically; around corners; over long distances; and to practically any number of delivery points. There are no mechanical or explosion hazards. Conveying is clean, fast, and at minimum cost per ton of material handled.

We invite you to have Fuller engineers make a study of your plant plans—investigate conditions and the material to be handled. Then they can make recommendations as to the system best adapted to your needs—enable you to save time, money, and material by having both plant and system built at the same time. To consult them places you under no obligation.

**FULLER COMPANY—CATASAUQUA, PA.**

Branch offices

Chicago—San Francisco—Los Angeles—Seattle—Birmingham

# Fuller

**DRY MATERIAL CONVEYING SYSTEMS AND COOLERS —  
COMPRESSORS AND VACUUM PUMPS —  
FEEDERS, AND ASSOCIATED EQUIPMENT**

P-149  
2112



Under the new standards of the Truck Mixer Manufacturers Bureau, the guaranteed capacity of all Jaeger "Mix Plus" truck mixers has been increased by  $\frac{1}{2}$  cubic yard.

With this increase in capacity Jaeger offers the "Maxi-Loader," a lightweight open-end loader that speeds the charging and discharge of larger batches and prevents their spilling while in transit.



## Jaeger guarantees you more capacity, and an open-end loader to handle it

**Faster, cleaner charging; no cement blow-back:** New hopper has largest throat opening of any open-end loader and also a longer reach to drop materials deeper into drum. Re-designed blade tips allow materials to fall freely.

**No spillage on steep grades or quick starts:** Deeper blades with spe-

cially shaped tips raise the water-level of the drum, insuring the maximum payload capacity possible with an open-end type loader.

**Faster, steadier discharge:** New, deep-lipped discharge blades prevent "fall-back" of material, insuring positive and uniformly faster discharge assisted by free-flowing apron design.

Nothing to obstruct the discharge of lowest slump concrete.

To fit your operation, Jaeger Mix-Plus units are also available with either sealed end-loader or top-loader with sealed discharge door, permitting maximum agitator payloads. For full information, see your Jaeger distributor or ask for Catalog.

### THE JAEGER MACHINE COMPANY

603 Dublin Avenue • Columbus 16, Ohio

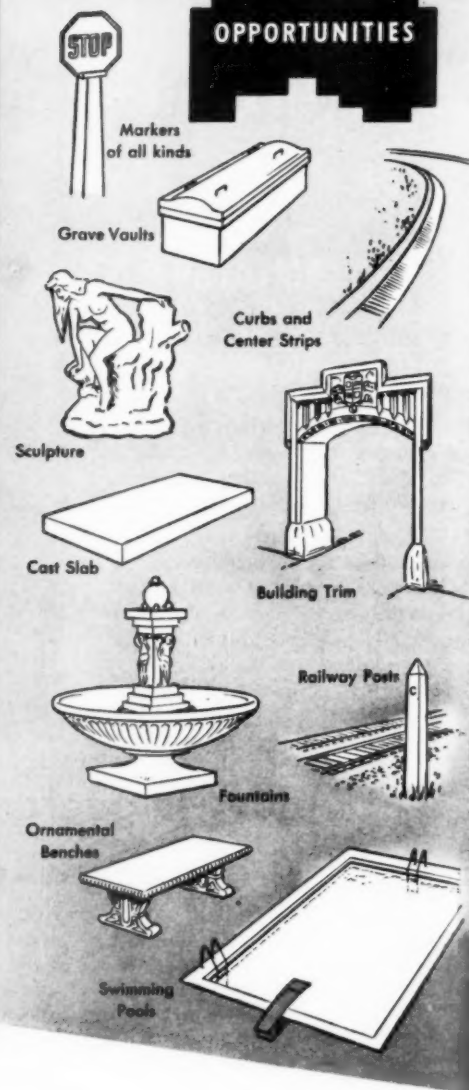
COMPRESSORS • TRACTOR LOADERS • PUMPS • CONCRETE MIXERS • PAVING MACHINES

# MEDUSA WHITE Portland Cements...

open the door to DOZENS of **PROFIT**  
OPPORTUNITIES

● Medusa White, the original White Portland Cement plain or waterproofed, white or tinted, actually opens the doors to an almost unlimited range of profit possibilities in the concrete products field. Those uses shown to the right are but a few. Wherever greater distinctive character and beautiful color effects are desired, whether it be in cast stone, concrete, cast slabs or any product that is made of concrete it can be made better and more beautiful with Medusa White Portland Cement, or Medusa Waterproofed White Portland Cement.

Now you can begin to see the tremendous sales possibilities for the concrete products manufacturer who utilizes Medusa Diamond-Blue, White (the original white) Portland Cement or its companion Medusa Waterproofed White Portland Cement for making his products. There is no end to the ideas that you can give your customers through the application of these cements to their building requirements. These cements are made by a company producing the finest in regular and special cements for over 60 years. You can rely on their integrity.



## MEDUSA Portland Cement Company

1000 Midland Building

Cleveland 15, Ohio

### SALES OFFICES

Cleveland, Ohio  
Chicago, Illinois  
Pittsburgh, Pa.  
Milwaukee, Wisc.  
Toledo, Ohio  
New York, N. Y.  
York, Pennsylvania

WHITE • WATERPROOFED WHITE • GRAY  
WATERPROOFED GRAY • AIR ENTRAINING • HIGH EARLY  
STRENGTH • STONESET • BRIKSET  
WHITE TILE GROUT CEMENT

MAKERS OF AMERICA'S FINEST PORTLAND CEMENTS FOR OVER SIXTY YEARS



**FAST AND CLEAN DISCHARGE** of even the lowest slump concretes is made possible by the patented blade design of this Worthington Hi-Up Truck Mixer, one of a fleet owned by the McNamee Ready Mixed Concrete Co. of Xenia, Ohio.

## "Drivers, shop men, customers—everybody likes our new Worthington Truck Mixers"

Says Charles F. McNamee of the McNamee Ready Mixed Concrete Co., Xenia, Ohio



**McNAMEE DRIVERS LIKE THE HI-UP** because its unrestricted hopper opening keeps charging time to a minimum. Both charging and mixing are accomplished with the drum rotating in the same direction. And the engineered weight distribution of the Hi-Ups lets you carry the maximum legal payload.

Mr. McNamee goes on to say:

"We particularly like our new Blue Brutes' heavy-duty transmission and their ease of operation. Our shop men like the provisions for easy maintenance; for example, they point out the relatively few lubrication points and their ready accessibility. The drivers say the machines are unusually easy to handle and to keep clean, that they mix and discharge exceptionally well. But what makes us happiest of all is that the machines and their product are liked by our customers."

We've been getting letters like this from Worthington Hi-Up Truck Mixer users all over the country. Why not find out for yourself about these modern Blue Brutes. Get the facts from your nearest Worthington distributor, or write directly to Worthington Corporation, Concrete Machinery Division, Section R.3.6, Plainfield, N. J.

R.3.6

# WORTHINGTON



IF IT'S A CONSTRUCTION JOB, IT'S A **BLUE BRUTE** JOB!

V-BELTS\* QD SHEAVES\* AIR COMPRESSORS\* CENTRAL MIXERS\* VERTICAL TURBINE PUMPS\* CIRCULATING PUMPS

CONCRETE PRODUCTS, April, 1954  
A Section of ROCK PRODUCTS

207

# "MY BUSINESS DOUBLED...IN 6 MONTHS"

SAYS MR. H. L. JONES...OF BOLIVAR, WEST VIRGINIA

**H. L. JONES**

BOLIVAR, W. VA.

**CONCRETE AND CINDER BLOCKS  
BURIAL VAULTS**

January 27, 1954

Columbia Machine Works  
Vancouver, Washington

Gentlemen:

I installed a new Columbia No. 8 fully automatic, with magnetic offbearer, pallet return, and cleaner and oiler on July 1, 1953.

Since then my business has doubled. Every-one using our blocks has been well pleased. I am more than pleased with the strength and type of block produced by this equipment.

Our daily average is between 500 and 600 8 by 8 by 16 block per hour.

I highly recommend this machine to anyone in the market for new and fast production.

Yours sincerely,

*H. L. Jones*



H. L. JONES, Owner



LLOYD JONES, Jr.

## A Real PROFIT-MAKER

The Columbia Model 8 is the ideal machine for the block producer who wants fast, automatic production of high quality block. Look at these features:

- 4-6 Cycles Per Minute
- Fully Automatic Electronic Controls
- Vibration Under Pressure
- Standard Plain Pallets



District Offices in: Wisconsin, Ohio, South Carolina, Mississippi, Florida, New Jersey, Virginia and California.

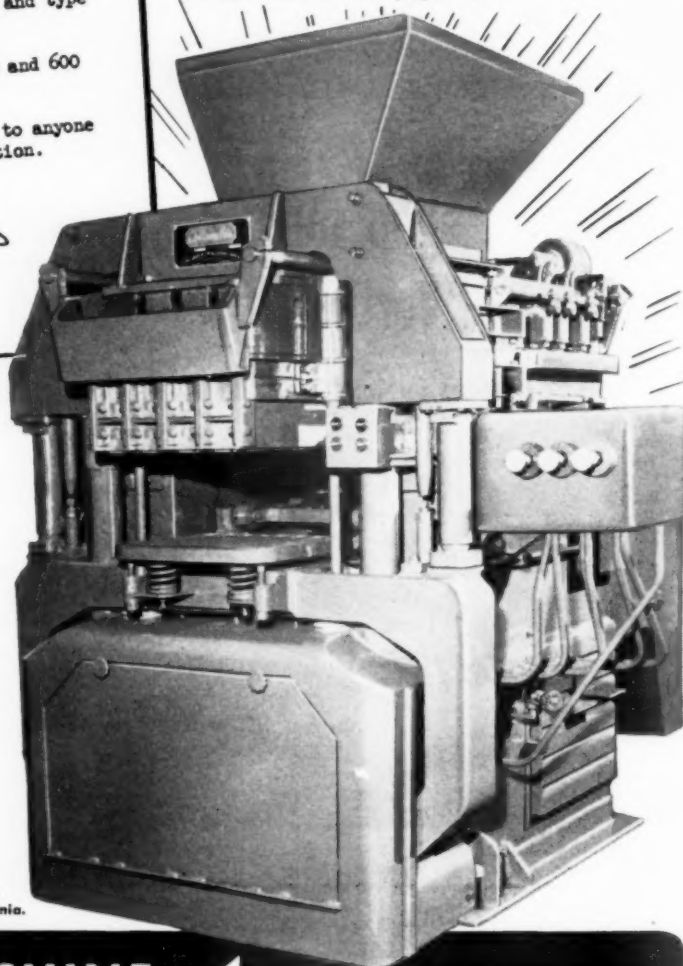
# Columbia MACHINE

Home Office: 107 S. GRAND, VANCOUVER, WASHINGTON

Factory Branch and Warehouse at Mukwanago, Wisconsin

## "OUR *Columbia* MODEL 8 BLOCK MACHINE TURNS OUT UP TO 600 BLOCKS AN HOUR..."

Like hundreds of other concrete block manufacturers, who have installed Columbia Model 8 two-block machines, H. L. Jones of Bolivar, W.Va. has discovered that he can get consistently high production of consistently high quality block. Installation of a single Model 8 fully automatic machine has enabled him to gain *twice* the volume of business that he could handle with his old equipment!



Write today for catalog describing Columbia line of one, two and three-block machines!

# PORTABLE CONCRETE EQUIPMENT

DESIGNED FOR SMALL TOWN, SUBURBAN AND ON THE  
JOB BATCHING OF CONCRETE, ALSO PROJECT BATCHING



AS YOU CAN SEE BY THE PRICES BELOW, A PLANT WITH ONE TRANSIT MIXER AND TRUCK CAN BE HAD FOR AS LOW AS \$11,265, AND THE ONLY ADDITIONAL EQUIPMENT NEEDED WOULD BE A FRONT END LOADER AND TRACTOR SUCH AS FORDSON WHICH DELIVERS IN MOST PARTS OF THE U. S. FOR \$2,350.

This plant comes in 15,000, 20,000 and 30,000 lb. sizes for batching 3-4-5 and 6 yard transit mixers.

They are equipped with 40 ft. by 24 in. belt conveyors capable of batching the largest mixer trucks under any local conditions.

Self powered conveyor, either gas or electric power. Water measuring equipment consists of tripple tank or Neptune water meter.

The hopper is 8 ft. square or less, so that it can be transported from one town to another on the highway and comes in 4, 5 and 6 yd. sizes.

## ***COMPLETE PLANT WITH MOTOR CONVEYOR, WATER METER & SUPPORTING STRUCTURE***

**15,000 lbs. 4 yard \$5,150**

**20,000 lbs. 5 yard \$5,250**

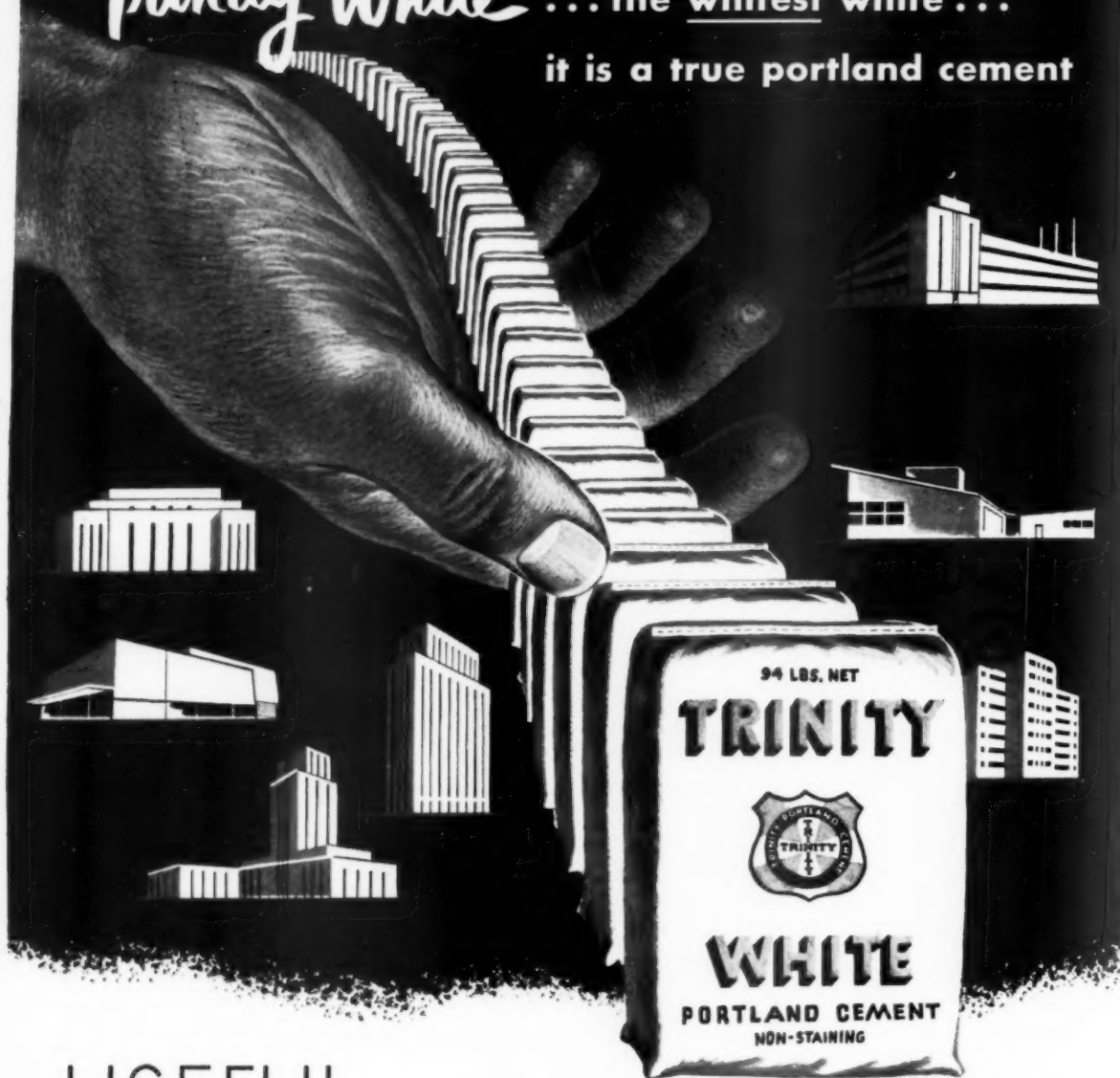
**30,000 lbs. 6 yard \$5,350**

## **AL WILLIS SALES COMPANY**

1620 Syracuse, Denver 8, Colo.

Telephone EAst 0726

*Trinity White* ... the whitest white ...  
it is a true portland cement



**USEFUL** in almost every type of building, both inside and outside.

As architectural concrete units or as stucco or cement paint, it emphasizes architectural perspective and detail. It has a high light-reflection which gives beauty and special utility to many interiors.

☛ Trinity White's extra whiteness gives truer colors where pigments are added.

Widely used in terrazzo for its contrast-y white and better color effects in either simple or ornate designs. Meets all Federal and ASTM specifications. Ask for TRINITY White.



A Product of GENERAL PORTLAND CEMENT CO. • Chicago • Dallas • Chattanooga • Tampa • Los Angeles

## **TIMELY MEMORANDUM**

The construction industry and all industry—is now entering an economic period that has been aptly described as “dramatically selective.” What does that mean to you and to me? Simply this: those people whose activities are wisely managed will maintain a sound business, even prosper—while those who take no heed of changing conditions, do not carefully analyze their position and operations, will find only economic stringencies as their reward.

Profit! Loss! Two of the most important words in a ready-mixed producer's language. So completely different in meaning, yet only a hairline apart. But how to analyze—and find that difference?

What one thing represents the greatest investment in your business? Transportation equipment! This, then, is the segment of your business where careful attention and study will turn up the most significant profit or loss figures.

Consider then: exactly what are your particular requirements? Legal maximum payload—operating conditions peculiar to your area—the degree to which you use your transportation equipment. These are the fundamentals of your problem!

The answer? For each of you who reads this, there is a different combination of factors, varied local conditions, widely diverse individual opinion—a single answer would seem impossible.

But there is an answer.

It is the Rex® Adjusta-Wate principle that allows the greatest choice of truck chassis, the greatest choice in mounting the mixer, and the greatest choice in type of operation. Starting from this basic selection, Rex components can be added to bring you the exact “transportation package” that means more trips per day, more revenue per trip—the answer to the most profitable operations for you.

Within the framework of your transportation demands: legal maximum payload, local operating conditions, the degree of equipment use, over-all operating cost—yes, and first cost, too—your nearby Rex Distributor can help you find the answer you are looking for. Construction Machinery Division of Chain Belt Company, 4649 W. Greenfield Avenue, Milwaukee 1, Wisconsin.

# EXTRA Quality...EXTRA Speed



## Six Firesafe Concrete Dormitories on Cornell's Beautiful Campus Erected with 'Incor' at Average Rate of a 5-story Frame every 11 Working Days

● Last Fall, six five-story dormitories—reinforced-concrete frames for utmost firesafety, speed, economy—were erected in record time on Cornell University campus: Foundations started August 13 . . . 1st floor concreted September 8 . . . last roof slab poured November 18, ahead of cold weather . . . 66 working days from first foundation to last roof slab (average, 11 days per building) . . . with foundations ranging from rock to caissons.

Good job planning and dependable 'Incor' high early

strength assure extra speed at less cost. Extra quality, too: You see it in the easy-placing mixes . . . in smooth exposed concrete surfaces . . . in minimum drying shrinkage . . . and in the intangible but important difference that the crew, conscious of quality on an 'Incor' job, gets the most out of the concrete.

Over 25 years' performance, on job after job, clearly shows that 'Incor' produces more dependable results, at less cost, than by experimenting with "an extra bag of ordinary cement in the mix." One contractor summed it up by saying that he sleeps sounder at night with 'Incor'® on the job. \*Reg. U.S. Pat. Off.

**MEN'S DORMITORIES,  
CORNELL UNIVERSITY**  
Ithaca, N. Y.

Architects & Engineers:  
**CHAPMAN, EVANS & DELEHANTY,**  
New York City

General Contractor:  
**C. E. YOUNGDAHL & CO., INC.,**  
Long Island City, N. Y.

Ready-mix 'Incor' Concrete:  
**RUMSEY-ITHACA COMPANY,**  
Ithaca, N. Y.

### DRYING SHRINKAGE OF CONCRETE

Tests of 3x3x12-inch concrete beams: cured in air of 50% relative humidity at 70°F. after 1 day in mold. Results are average of 3 specimens for each cement from batches mixed on different days.

Mix bags/co. yd.	Water gal./bag	Drying Shrinkage— <i>inches per 100 ft.</i>				
		3 d	7 d	28 d	3 mo.	1 yr.
Average 10 Lone Star Type I Cements (6-inch slump)						
3½	10.59	.156	.264	.516	.612	.648
4¼	8.27	.156	.24	.516	.624	.684
5	6.78	.18	.252	.528	.66	.696
6	5.62	.168	.228	.48	.636	.684
7½	4.65	.156	.228	.468	.636	.696
Average 10 'Incor' Type III Cements (6-inch slump)						
3½	10.48	.156	.252	.516	.648	.672
4¼	8.29	.156	.216	.48	.636	.672
5	6.9	.144	.216	.468	.636	.672
6	5.83	.156	.228	.444	.636	.684
7½	4.93	.156	.24	.48	.648	.708

Shrinkage of 'Incor' concrete is the same or less than concrete with Type I cements, through a wide range of equivalent mixes. 'Incor' develops greater strengths at early and later ages and is therefore better able to withstand shrinkage stresses. On the job, proper curing, starting at the earliest possible time, reduces shrinkage effects with all types of cement.



LONE STAR CEMENTS COVER  
THE ENTIRE CONSTRUCTION FIELD

## LONE STAR CEMENT CORPORATION

Offices: ABILENE, TEX. • ALBANY, N. Y. • BETHLEHEM, PA. • BIRMINGHAM  
BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS  
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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 18 MODERN MILLS, 136,000,000 SACKS ANNUAL CAPACITY

**Autoclave Building Products Association convention program includes silica flour research, kiln door design, foam concretes, new high pressure plant details, and labor-producer co-operation**



New officers for the ensuing year. Left to right: Elmer R. Coats, sand-lime products committee chairman, Seattle, Wash.; Ralph E. Cromis, concrete products committee chairman; Dale Cobb, president, Jackson, Miss.; Leo J. Ryan, vice-president, Windsor, Ont. Canada; Henry DeGeus, III, secretary-treasurer, Saginaw, Mich

## More Producers Go to High Pressure Curing

**T**HE AUTOCLAVE BUILDING PRODUCTS ASSOCIATION held its 48th annual convention at the Jefferson Hotel, St. Louis, Mo., on March 8-10, 1954. The meeting was of increased importance because of the trend within the concrete masonry field towards high pressure steam curing for concrete masonry units. This trend became more evident when two large and well established producers adopted H. P. S. C. and placed their plants in operation during the past year. Several other large producers have also indicated that they intend to do likewise.

This trend towards H. P. S. C. is attributed to two important factors; first, the advocates of H. P. S. C. show convincing evidence that an improved block is made by this system, and secondly, due to the use of silica as a replacement and/or additive for portland cement, economies result that indicate a lower over-all cost per block unit. Probably one of the most important papers was on this subject, and it acted as a magnet drawing many silica producers, concrete technologists, and others. The paper on silica flour resulted from a research program that the National Pulverizer Co., Millville, N.J., and the South River Sand Co., Old Bridge, N.J., sponsored. The paper was delivered by Ralph L. Barbehenn, concrete technologist who did the work for the two silica producers. This paper will be published in more complete detail, but briefly it brought out the advantages of silica flour over other materials.

Dale Cobb, sales manager, Concrete Products Division, Jackson Ready-Mix Concrete Co., Jackson, Miss., and president of the Autoclave Building Products Association, presided.

After an address of welcome by Frank Lawrence, St. Louis Chamber of Commerce, Jack Rausch, a member of Russell, Mulgardt, Schwarz and Van Hoefen, architects, St. Louis, Mo., presented "An Architects Viewpoint on Concrete Masonry." Mr. Rausch's talk could be summed up by saying that the architect wants facts from the masonry producer and not idle claims.

W. C. Hansen, Committee Chairman, Manager Research Laboratories, Universal Atlas Cement Co., Gary, Ind., reviewed the activities of A. C. I. Committee 716 that relates to high pressure steam curing.

Following Mr. Hansen, E. R. Coats, past president, Unit Masonry Association of Washington, Seattle, Wash., described his association's activities. This association is unique in construction circles for it was instigated by members of the brick layers' union in Seattle who noted the falling off in masonry construction in their area. Many were walking the streets because tilt-up, monolithic concrete, and frame construction were severe competitors. The union members assessed themselves 40 cents per month to finance advertising of masonry construction. The union officials next contacted the contractors, building supply manufacturers [such as concrete block, sand-lime brick, clay brick, stone and slate suppliers, etc.] and asked them to contribute to the fund, which they did. Out of this movement, came the formation of the Unit Masonry Association whose purpose it is to coordinate the advertising and promotional activities of all parties interested in masonry construction. The results have been very favorable, almost dramatic, and it was brought out by Mr. Coats that this was probably the first time that an important union set the wheels in motion in an effort to better all phases of an industry. The association was formed in 1952 and many groups elsewhere have evidenced great interest in this new movement. The Unit Masonry Association of Oregon has just begun to function, the speaker said.

### New Buffalo, N.Y. Plant

Fred Reinhold, president, Anchor Concrete Products, Inc., Buffalo, N.Y., gave an informal talk describing his company's new autoclave installation that started operating early in March of this year (1954). Mr. Reinhold said that it was important to have an autoclave installation designed by competent engineers. The new plant

has three 10- x 89-ft. kilns which will handle 15,000 units per day. The 600-hp. boiler is adequate for additional autoclaves up to 40,000 units per day. A rectangular rack, holding 108 standard 8's is used. Future mechanical loading and stripping devices adapt themselves better to conventional rather than contoured racks. In deciding on 10-ft. dia. vs. 8-ft. dia. kilns, the speaker said that the engineers indicated very little difference in steam consumption between the larger and the smaller kilns. The use of 108-block racks as contrasted with the 72 means that less lift trucks are needed. Mr. Reinhold said he also had recently purchased two 7-ft. kilns that he may use for light cellular concrete items. These also could be used to high pressure steam cure palletized concrete units that had been given a preliminary low pressure steam curing. He indicated he may later replace these smaller kilns with the 10-ft. size.

### Autoclave Door Design

The paper prepared by John K. Selden, Coordinator of Housing Research, Research Dept., University of Toledo, Toledo, Ohio, was delivered by N. D. Harter, Harter Marblecrete Stone Co., Oklahoma City, Okla., as Mr. Selden was at the moment assisting with the starting of Mr. Reinhold's new plant at Buffalo. The paper dealt with autoclaves and particularly autoclave doors and the need for emphasizing safety in their design. He discussed the various types of doors, including the guillotine type, the breach lock door, the snap ring door, and the older conventional bolted door, pointing to some of the advantages and disadvantages of all types. The writer of the report said he was working on a tentative design for a power-driven, multiple-bolt spinner and setter that could handle 12 or more nuts at one time. The author also discussed corrosion allowances in autoclave designing, and the advantages and disadvantages of local steel fabricators manufacturing the drum section and assembling the autoclave. Here again safety was the predominant theme.

Ray Hickman, chief engineer, Richmond Engineering Co., Richmond, Va., discussed "Pressure Vessels for the Curing of Concrete Products." He emphasized the need for quality control when designing and fabricating an autoclave to meet all safety code requirements. The trend was to larger diameter kilns, and this imposed handling and shipping problems. The use of better steel in fabricating pointed to a possible reduction in weight. Mr. Hickman showed slides of some of the doors in use. During the discussion that followed it was brought out that the spacing of vacuum rings was a matter of engineering calculation based on the diameter of the kiln and thickness of steel.

The session ended with a tour of the Anheuser-Busch brewery followed by a bus trip to Pacific, Mo., where the operations of the Pacific Brick & Block Co. were inspected under the sponsorship of Carl Miller, president.

### Foam Concretes

The final session was high-lighted by an informal talk by Rudolph Valore, Building Technologist, National Bureau of Standards, Washington, D. C., who reviewed the subject of foam concretes and used slides to illustrate his subject. One type of concrete shown was made by adding a previously formed foam to the mixer. Various types of generators to make the foam were shown. The talk was essentially a review of an A. C. I. paper delivered at Denver, Colo., this year and which is reviewed in this issue.

It was tentatively decided that the next meeting would be held in Buffalo, and this stemmed from an invitation extended to the group by Fred Reinhold of that city. No date was set. The following officers were re-elected: president, Dale Cobb, sales manager, Concrete Products Division, Jackson Ready-Mix Concrete Co., Jackson, Miss.; vice-president, Leo J. Ryan, president, Ryan Builders Supplies, Ltd., Windsor, Ont., Canada; secretary-treasurer, Henry DeGeus III, manager, Saginaw Brick Co., Saginaw, Mich.; sand-lime products committee chairman, Elmer R. Coats, vice-president, Mutual Materials Co., Seattle, Wash.; and concrete products committee chairman, Ralph E. Cromis, manager, Boice Builders' Supply, Pontiac, Mich.

## Effect of Silica Flour In Autoclaved Cement-Sand Mixtures

By RALPH L. BARBEHENN\*

THIS DATA covers a laboratory examination of silica flour additions to portland cement in cement-sand mixtures designed for autoclave steam

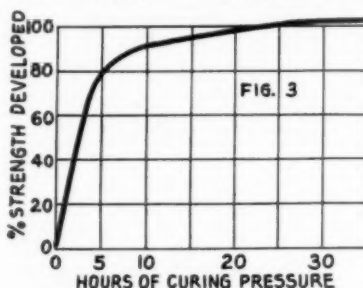


Fig. 3: Typical curve form, showing strength development vs. autoclaving time. 30-hr. cure equals 100 percent strength

curing in contrast to normal air curing or atmospheric steam curing. Strength and economic factors are considered. The report corrects an impression that relatively fine sand in place of silica flour can be successfully used in autoclave work. The research program was sponsored by The National Pulverizing Co., Millville, N. J., and the South River Sand Co., Old Bridge, N. J.

The data in this study show that the use of a properly selected and ground silica flour is highly desirable, even when relatively fine sands are used as a part of the aggregate. Strength gains amounting to better than 50 percent over the normal cured materials were secured, and commercially such gains can be obtained with a lower raw material cost. The raw material cost may be reduced further if manufacture is to a specified strength based on normal cure products.

The size grade of the silica flour is not particularly critical, but it should apparently provide not less than 70 to 75 percent passing a 200 mesh sieve.

The purity of the silica flour, in

\*The original report was delivered at St. Louis, Mo., at the Autoclave Building Products Association meeting.

terms of available  $\text{SiO}_2$  is important. The use of low silicious materials, such as fly ash, resulted in a definitely lower strength. The silica itself is required for reaction with the portland cement in the autoclaving process. Since silica flour furnishes almost 100 percent available  $\text{SiO}_2$ , a more efficient and complete reaction is obtained.

### Properties of Materials

Typical physical and chemical properties of the various ingredients used are as follows:

	Portland Cement	Silica Flour	Fly Ash
CaO	63.2	0.01	4.8
$\text{SiO}_2$	22.5	99.08	35.6
$\text{Al}_2\text{O}_3$	5.1	0.25	28.3
$\text{Fe}_2\text{O}_3$	2.9	0.21	12.8
MgO	2.9	tr	0.9
$\text{SO}_3$	2.0		
$\text{TiO}_2$		0.13	
$\text{Na}_2\text{O}$		0.03	
K <sub>2</sub> O		0.04	
Loss on Ignition	0.6	0.22	
Specific Surface (Wagner)	1840		

Sieve	Regular Sand (Percent Passing)	Special Fine Sand (Percent Passing)
20	90.34	98.99
40	54.85	91.35
60	16.47	59.59
80	5.63	22.81
100	3.47	12.40
200	1.16	0.37

### Silica Flour

Grade No. 70. 98 percent through 90 mesh sieve; 70 percent through 200 mesh.

Grade No. 85. 98 percent through 120 mesh sieve; 85 percent through 200 mesh.

Grade No. 95. 98 percent through 160 mesh sieve; 95 percent through 200 mesh.

The study was limited to mixtures of portland cement with sand as the aggregate, plus silica flour, fly ash, including powdered glass, as indicated in the report.

Type I portland cement, and a minus 10 mesh building sand were used. Three grades of silica flour were used. The fly ash was a commercial product.

A basic proportion of 2.75 parts of sand to one part of cement, by weight, was used throughout. In all samples containing silica flour, this material was used to replace a portion of the cement, so that the total "cementing material"—cement plus silica flour, as reacted in the autoclave—remained constant at one part in a total of 3.75 parts. For these samples, the common commercial ratio of six parts of silica flour to 10 parts of portland cement was maintained. The actual batch weights per sample were:



Officers and many of those attending Autoclave convention

	Normal Cure Mix	Autoclave Cure Mix
Sand (aggregate)	220 grams	220 grams
Portland cement	80 grams	50 grams
Silica flour	none	30 grams

The fly ash was used on two bases: as a direct replacement for the silica flour, and as a replacement for only 30 percent of the cement. The powdered glass was used as a direct replacement for the silica flour. Each test sample was separately prepared using a total dry material weight of 300 grams, and 70 ml of water. This corresponds essentially to a water content of 10 gallons per sack of cement.

In preparing the samples, the sand and water were mixed for one minute; the cement or cement and silica flour was then added and mixing continued for five additional minutes. The mixing water was uniformly at 90 deg. F. A mechanical "planetary" type mixer was used. The mixed batch was turned out of the mixing bowl into a circular mold 6 in. in diameter. This had been placed on a glass flat and lightly oiled. The batch was roughly leveled and vibrated by mechanically dropping it through a one inch height for 50 drops.

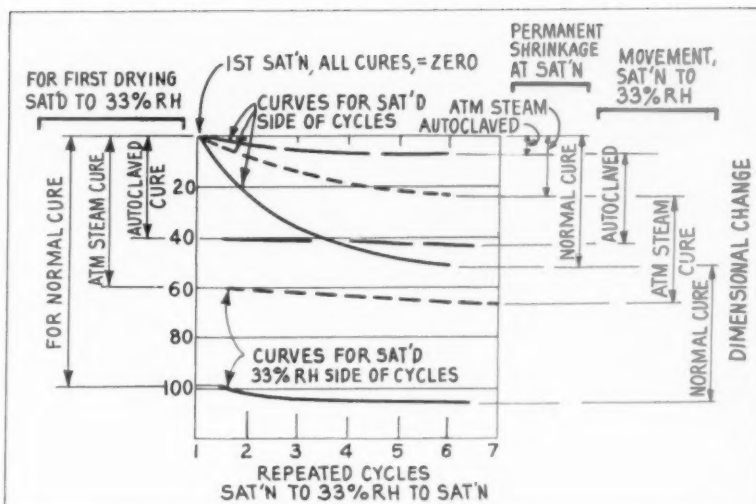
The molded samples remained under room conditions for five hours. They were then removed from the molds and cured as required. The resulting samples were 6-in. discs, about 0.35 in. thick, very smooth on the bottom and quite level on top. The top surface was lightly sanded before testing to remove any irregularities that might be present. "Normal cured" samples were placed in a damp closet immediately after removal from the molds. The chamber was maintained at 77 deg. F. and a relative humidity of 85 percent. "Autoclaved" samples were cured immediately after removal from the molds. The pressure chamber was electrically heated and controlled, reaching the curing pressure of 110 p.s.i. gauge (saturated steam) in 2 hr. Air was carefully vented for each cure, and pressure was maintained for 8 hr.

The samples were tested in flexure, using a 5-in. span, and due to their circular form, permitted two test breaks per sample. Load was measured on a proving ring type of indicator. A pivoted knife edge was used for the center bearing. Load readings were accurate to 0.5 lb. in the test range of 70 to 190 lb. Tests were made after drying the samples for 48 hr. at 220 F.

Table I summarizes the data for normal vs. autoclave cured samples, both with and without silica flour included and, fly ash.

Using the normal cure results as the base, it will be observed that autoclaving this sample furnished with no silica flour addition, gave an increase in strength of 55 percent. This unusual strength was possibly due to the use of a finer than average commercial sand as 23 percent passed the 80 mesh sieve.

When silica flour was included, the



Dimensional behavior on wetting and drying cycles. Note that the dimensional change for first drying of the normal cure, saturation to 33 percent relative humidity, has been taken as the base value at 100. Normal cure equals 21 days, 77 F, 85 percent relative humidity

increase was 67 percent. This latter increase, however, was secured with a reduction of 38 percent in the actual amount of portland cement used.

At the present time the price of portland cement in bulk is about \$19.50 per ton, f.o.b. mill. The price of silica flour in the number 85 grade used here is \$7 per ton (bulk) f.o.b. plant. Since the quantity of cement or of cement plus silica is the same for both the normal cure and the autoclave cure formulas, we can say that the "cementing material" cost and the relative strengths obtained are:

For normal cure, normal cured (no silica flour used): \$19.50 per ton; strength 100 percent.

For normal cure, autoclaved (no silica flour used): \$19.50 per ton; strength 155 percent.

For autoclave cure, autoclaved (with silica flour): \$14.70 per ton; strength 165 percent.

Ground glass in autoclave: no value as it disintegrated in autoclave.

The economic gain for the autoclave cure may be made even greater than the indicated \$5 per ton of cementing material. If 100 percent strength is all that is required, a portion of the cementing material in the autoclave cure may be replaced with aggregate.

The success of autoclaving with silica flour appears to be directly related to the total availability of  $\text{SiO}_2$  in the flour to react with the lime liberated when portland cement sets. The reaction is said to form a crystalline mono-calcium silicate. This is a strong, stable and essentially insoluble material whose character does much to give other good properties to the autoclaved product. The silica needs to be available for this reaction. If a portion of it is already bound up, as with alumina, it may not become available for the reaction with the lime. If the quantity of such a material is increased so that the available silica in it is enough for the purpose, the re-

mainder of this material becomes simply an inert filler of no use to the product as a whole. Fly ash, for example, contains a high percentage of alumina, and is only about one-third silica.

Two fly ash combinations were used: replacing 30 percent of the cement; and replacing the silica flour (38 percent replacement of the cement). Both were examined only for the autoclave cure. The data show that these developed much less strength than those using silica flour, and in fact were only comparable to the samples normal cured. We can make the following comparison of cost of "cementing material" per ton and relative strength, as for the previous example. Fly ash in the New York area is about \$5.50 per bulk ton, delivered.

Normal cure furnish, normal cured: \$19.50 per ton; strength 100 percent.

Autoclave furnish, autoclaved: \$14.70 per ton; strength 100 percent. Fly ash, 30 percent replacement, autoclaved: \$15.25 per ton; strength 112 percent.

Fly ash, 38 percent replacement, autoclaved: \$14.15 per ton; strength 90 percent.

The data obtained in this study thus indicate that there is a disadvantage in both cost and strength if fly ash is used to replace silica flour in the autoclaved product.

All samples made using powdered glass as a substitute for silica flour failed in the autoclave. The cured test specimens using silica flour gave a hard and whiter colored end product. These specimens broke with a clean edge and indicated a more uniform cement reaction when compared to normal cures.

The specific gravities and water absorptions of the samples followed the usual pattern for normal cured and autoclaved materials. It is of interest and importance to note, however, that

(Continued on page 219)



Board of directors, American Concrete Pipe Association. Seated, left to right: Louis F. Dolch, Dolch Concrete Pipe Co., Dallas, Texas; A. B. Metcalf, Columbia Concrete Pipe Co., Wenatchee, Wash.; vice-president, Hugh P. Ford, Eugene Concrete Pipe and Products Co., Eugene, Ore.; R. B. Carroll, Shearman Concrete Pipe Co., Inc., Montgomery, Ala.; secretary, David A. Decker, Mid-West Concrete Pipe Co., Franklin Park, Ill.; president, A. W. G. Clark, B. C. Concrete Co., Ltd., Vancouver, B. C., Canada; and Ivy H. Smith, Sherman Concrete Pipe Co., Jacksonville, Fla. Standing, left to right: G. B. Denham, Faulkner Concrete Pipe Co., Hattiesburg, Miss.; treasurer, J. D. Mollendorf, Continental Concrete Pipe Corp., Chicago, Ill.; vice-president, Harry W. Heath, Lock Joint Pipe Co., East Orange, N. J.; vice-president, Carl A. Bluedorn, Zeidler Concrete Products Machinery Co., Waterloo, Iowa; outgoing director, G. D. Williamson, Valley Concrete Pipe and Products Co., Yuba City, Calif.; Henry C. Eames, New England Concrete Pipe Corp., Newton Upper Falls, Mass.; managing director, Howard F. Peckworth; R. A. Norman, The Cretex Companies, Inc., Elk River, Minn. Missing directors are Peter Van Kuran and H. E. Eschenbrenner, Jr.

## Gear Up For Competitive Pipe Markets

**American Concrete Pipe Association convention**

**in San Francisco reviews changing market conditions**

**and new developments in concrete pipe design and materials**

**T**HE 46TH ANNUAL CONVENTION of the American Concrete Pipe Association in San Francisco, Calif., was noteworthy in several respects. The members elected a president for 1954 from north of the border in Canada; the industry faced up to the changes resulting from the growing "buyer's market"; attendance was high and representation was from widely scattered areas, including 33 states, three Canadian provinces, Puerto Rico and Alaska. Addresses were presented by five eminent west coast engineers and there was lively inter-industry discussions at the business meetings and during the half-day "jam session."

### New Officers

Approximately 350 persons registered for the annual meeting which was held at the Fairmont Hotel from February 24 through the 27th. A. W. G. Clark, president of B. C. Concrete Co., Ltd. of Vancouver, British Columbia, Canada, was elected president of the American Concrete Pipe Association for 1954. Hugh P. Ford, Eugene Concrete Pipe and Products Co., Eugene, Ore., was elected as a vice president to serve with Harry W. Heath, Lock Joint Pipe Co., East Orange, N. J., and Carl A. Bluedorn, Zeidler Concrete Products Machinery Co., Waterloo, Iowa. David A. Decker,

Mid-West Concrete Pipe Co., Franklin Park, Ill., was re-elected secretary. J. D. Mollendorf, Continental Concrete Pipe Corp., Chicago, Ill., was re-elected treasurer.

Ivy H. Smith, Sherman Concrete Pipe Co., Jacksonville, Fla., outgoing A.C.P.A. president, was elected to the board of direction for a three year term along with Henry C. Eames, New England Concrete Pipe Corp.,

Newton Upper Falls, Mass., and George B. Denham of Faulkner Concrete Pipe Co., Hattiesburg, Miss.

### Changing Markets

The report of President Ivy H. Smith and the report of Managing Director, Howard F. Peckworth, brought out many of the same problems which face this and other industries for the coming year. President Smith said that he had travelled almost 25,000 miles on business directly or indirectly related to the association during 1953. They said that 1953 was a year of rapidly changing times. There was an especially bright outlook at the beginning of the year when cement and steel went from short supply to ample supply. But the market changed from a seller's market to a buyer's market and competition increased within the industry and with competing industries. Those companies which were unprepared for the new development found that they lost many lucrative contracts to their more aggressive competitors.

In the meantime, they said, the change in the national administration brought further need for readjustments. Top ranking men in many of the bureaus were replaced. Some of the new men followed existing patterns; some went back to pre-demo-



A. W. G. Clark, newly elected president of the American Concrete Pipe Association, right, presenting a plaque and gavel to Ivy H. Smith, outgoing president

cratic ideas and some began aggressive campaigns to modernize their departments. It was necessary, and still is, to familiarize these bureaus with the new developments in the industry such as new methods of manufacture; proven hydraulic coefficients; increases in strength of pipe; research on sewer design; and improved methods of installing pipe to utilize these qualities.

In the period of adjustment which followed, they said, some saw the warning signs and keyed their programs to fit the needs. Others saw only that "business was bad" and chose to blame unseen bureaucrats in Washington for discriminating against them. Subsequent blame fell on the association for failing to counteract this. Tedious investigation and several local meetings revealed the basic trouble to be in lack of local promotion on the part of individual manufacturers.

It is felt now that the road ahead is more clearly defined and that, with their work cut out for them, the concrete pipe manufacturers will find 1954 as productive generally as 1953. The concrete pipe industry, Mr. Peckworth said, probably produced about 11,000,000 tons of pipe during 1953, which is about the same as 1952. It seems, he said, that production and sales were up in some parts of the country while down in others, but that the average was about the same. The trend, however, he pointed out, is toward larger diameters. This is an important factor when computing the tonnage output of the industry. The industry was called upon to maintain its high quality, to watch installations so that the product was installed to its best advantage and to concentrate on local promotion so that 1954 would be at least as big a year as 1953.

In his second report to the association since becoming its Washington representative, John A. Ruhling described work he had been doing in the nation's capital and outlined two of his primary objectives for the coming months. One is to gain full recognition by all government agencies of the true hydraulic capacities of concrete pipe and corrugated metal pipe based on experiments at the University of Minnesota Hydraulic Laboratory and on recent tests by the government in the state of Washington. The other objective is to bring to the attention of all concerned the load bearing ability of concrete pipe under various bedding and backfilling conditions. The result of this should be a recognized standard table of allowable minimum and maximum heights of fill for concrete pipe installations.

John G. Hendrickson, Jr., Association Research Engineer, reported on strength tests on large diameter pipe, research on joints in Georgia, research on concrete pipe sewers at Tulane University, the forthcoming Highway Culvert Hydraulic Handbook, and the 4th Annual American Concrete Pipe Association Short



Board of Governors of Concrete Pipe Association, Inc. Left to right: Ivy Smith, G. D. Williamson, Howard F. Peckworth, managing director; A. W. G. Clark, Harry S. Price, Jr., Ray A. Foley, and Wm. B. Freeman

Course School of Instruction. Mr. Hendrickson expressed hope that the tests on large diameter pipe would result in data leading to an accurate design of pipe over 72 in. in diameter.

The Association School will be held at the Statler Hotel in St. Louis, Mo., on October 25th through the 27th.

### Entertainment

Entertainment was provided for the conventioners in the form of a night club party at Bimbo's 365 Club on the second night of the meeting and a cocktail party and banquet with entertainment and dancing on the final night. The many ladies who attended with their husbands were given tours of the shops and fashion shows in addition to a daily "coffee hour" to get acquainted.

An interesting highlight of the non-technical phase of the program was an illustrated talk by Hilda Dunn, wife of past president Joseph A. Dunn, on "Impressions of Other Lands," describing their round-the-world tour last year.

### Concrete Pipe Ocean Outfall

The final day of the four-day meeting was devoted to four technical papers by guest speakers and a panel discussion on industry problems. The speakers were A. M. Rawn, chief engineer and general manager of the County Sanitation Districts of Los Angeles County, Calif., on "The Manufacture and Construction of a Large Concrete Pipe Ocean Outfall," Charles Gilman Hyde, Sanitary and Hydraulic Engineer from Berkeley, Calif., on "Improved Storm Drainage and Sewerage Works for the City of Watsonville, Calif., Raymond E. Davis, Director Emeritus of the Engineering Materials Laboratory and the University of California in Berkeley, on "Pozzolanic Materials—With Special Reference to Their Use in Concrete Pipe," and R. Robinson Rowe, Bridge Research Engineer of the State of California, Department of Public Works, on "Concrete Pipe Culverts in an Expanding Highway Program." Walter R. McLean, Supervising Civil Engineer of the East Bay Municipal Utility District in Oakland, Calif., prepared and delivered a comment on Mr. Davis' paper entitled, "Pozzolanic Materials and Their Use in Concrete

Pipe and Structures of the East Bay Sewage Disposal Project."

Mr. Rawn illustrated two projects with some 50 slides. They were on the construction and installation of 7800 ft. of 12-ft. diameter, reinforced concrete pipe in an open trench and the installation of a controlled sewage diffuser outlet on a 72-in. diameter ocean outfall.

Mr. Rawn said that he spoke first to the American Concrete Pipe Association in 1930 on careful control of the design of non-reinforced concrete pipe. Since that time, he said, new designs have led to even greater confidence in concrete pipe.

The 12-ft. diameter concrete pipe which Mr. Rawn described was manufactured in 12-ft. lengths with tongue and groove joints and with a shell thickness of 12 in. Reinforcing consisted of a double cage, one of which was elliptical in shape, with the minor axis vertical. The pipe was manufactured at the manufacturer's yard and shipped to the job on trucks.

He pointed out that the forms used by the United Concrete Pipe Corp. for these sections were water tight, eliminating leakage of grout or water. External vibration was used to consolidate the mix in the forms. Tests of the concrete in these pipe show strengths of as much as 7000 p.s.i., Mr. Rawn said.

Mr. Rawn showed pictures of a 12-ft. diameter pipe described to the association in 1950. It was bedded in lean concrete. It has shown no evidence of leakage for over four years, he said, although operating under internal heads up to 35 ft.

Before describing the diffuser outlet Mr. Rawn discussed some other outfalls in his area. He mentioned the 60-in. outfall, 2000 ft. long, completely imbedded in place in tremied concrete in a rock trench in 1935. The fully flexible joints used on that line are no longer regarded by the District as necessary, Mr. Rawn said, and a joint is now specified which permits a deflection of 4 deg. without leakage.

He said that a large number of small holes are now being drilled in the 60-in. pipe to gain better diffusion. A 9-in. core taken from one section of pipe was brought to the meeting by Mr. Rawn. He pointed out the



Board of directors, American Concrete Agricultural Pipe Association. Seated at the table are: A. M. Herman, Colton, Calif., president, seated at far end of table; G. F. Lillie, Fremont, Neb., secretary; W. B. Freeman, Denver, Colo., treasurer; Earl H. Eby, Helena, Mont.; H. B. Tellyer, El Paso, Texas, vice-president; G. D. Williamson, Yuba City, Calif.; R. R. Reynolds, Exeter, Calif.; H. F. Peckworth, managing director, and Mrs. Millet, stenotypist

barnacle incrustation on the outside and the excellent condition of the concrete and reinforcement after almost 20 years in sea water. He said also that the incrustation of marine fauna on the exterior of the pipe showed that there is little if any effect on marine life in the area through which the sewage plant effluent is carried. Mr. Rawn described in considerable detail the manufacture and installation of extensions to 60-in. and 72-in. outfalls and diffusers attached to the 24-ft. extensions.

Dr. Hyde's paper was prepared jointly with John T. Norgaard, Sanitary Engineer with Brown and Caldwell, San Francisco. The story of the Watsonville, Calif. sewerage and drainage program, Dr. Hyde said, is similar to hundreds of others in our country, with some exceptions. The city and surrounding drainage area has a population of about 35,000 with an estimated population of 50,000 by the end of the century. The city and adjacent areas are now served by sanitary sewers. But they are becoming inadequate because of industrial developments, increased population and storm water contributions. Thus, he said, larger sanitary sewers and a separate industrial sewer are required with the elimination of illicit rain water connections.

Dr. Hyde told of the present method of collecting sewage and conveying it some 2.1 miles through parallel 12 and 24-in. lines to a screening-pumping plant. The 24-in. pipe is of plain concrete, he said. It was laid some 42 years ago and is still in excellent condition. The fine-screen effluent is pumped into a 2-in. reinforced concrete down-grade force main 14,450

ft. long to a surge chamber on the beach of Monterey Bay from which it is conveyed 1750 ft. into the bay to be discharged.

He said that an industrial sewer 2.5 miles long is required as well as a 42-in. down-grade force main to supplant the relatively small existing one. The present line has a capacity of about 3.0 m.g.d. as a gravity line at low tide. The new main would have a capacity of 18.5 m.g.d. with a maximum pressure head of 21 ft. at its upper end. The new 14,500-ft. line will be of reinforced concrete pipe with rubber gasketed joints, Dr. Hyde explained. It will be kept full at all times to insure positive prevention of sulfide buildup. In addition, a 36-in. concrete outfall will replace the two 16-in. wrought iron outfalls now used. For one thing, the larger outfall will reduce required pumping heads.

#### Pozzolans For Concrete Pipe

Raymond E. Davis commented on the great strides which have been made in the last 20 years in the machinery, methods, and techniques of production used in the concrete pipe industry. But, he warned, concrete pipe that would not deteriorate at all over the years, and would be completely impervious to the passage of moisture and be totally immune to the action of acids and alkalis cannot be obtained so long as portland cement is the basic cementing ingredient. There are ways, however, he said, of making it less permeable, less subject to the deteriorating effect of leaching, more resistant to the action of aggressive waters, and one of these ways is through the use of some of the pozzolanic materials.

He defined pozzolans and told of their contributions to strength and impermeability when combined with the hydrated lime in the presence of moisture. The pozzolans now in common use include the fly ashes of the East and Middlewest, calcined and uncalcined diatomaceous earth, and calcined and uncalcined opaline shales and pumicites of the West, Mr. Davis said.

He said that many pozzolanic materials are much finer than portland cement. They can increase workability of a mix and reduce the tendency towards bleeding and segregation of fresh concrete but shrinkage of the hardened concrete is likely to be greater except for the case of fly ashes of low carbon content.

Generally speaking, Mr. Davis said, the strength of concrete at the early ages is less for a concrete containing pozzolan in normal amount than is the strength of corresponding concrete containing straight portland cement. However, under moist conditions, at later ages, the strength of concrete of proper mix may actually be increased over corresponding portland cement concretes by using suitable pozzolans.

Regarding permeability, concretes containing pozzolans were found to be many times more permeable than those with straight portland cement after 28 days, but the reverse was true after as much as six months had elapsed. The gain in strength and water-tightness will continue for a long period of time under moist conditions whereas a straight portland cement concrete will retrogress due to leaching action. He suggested strongly that specification writers keep this time lapse in mind when preparing the requirements of performance specifications.

Mr. Davis' talk was illustrated with a number of charts and pictures of the effect of adding pozzolans or replacing cement with varying percentages of them on the tensile strength, compressive strength, permeability sulfate resistance and acid resistance.

Walter R. McLean's paper dealt specifically with the concrete pipe and other concrete structures in the recent \$23,500,000 East Bay Municipal Utility District improvement. The project consists of three large interceptors collecting sanitary sewage from existing outfalls of six cities, pumping plants, sewage treatment plant and an outfall sewer to San Francisco Bay.

Of the 21.93 mile interceptors, 18.28 miles are of concrete pipe 12 to 96 in. in diameter. The outfall consists of 2.87 miles of 96 and 108-in. diameter reinforced concrete pipe. The latter was vertically cast, the former centrifugally spun.

Mr. McLean explained that the lines were laid in soils containing aggressive ground waters and that Mr. Davis and his Engineering Materials Laboratory of the University of Cali-



Panel for discussion of operating problems. Left to right: Harold W. Chutter, standing, moderator; Jos. A. Dunn, Geo. P. Duecy, Fred Spiekerman, and H. H. Torney

fornia were called upon to recommend an admixture which would be economical and prolong the life of the system and lower maintenance costs.

A portland-pozzolan cement or a portland cement and a finely divided pozzolan added at the mixer as a cement replacement were recommended, Mr. McLean said. A further recommendation was the use of a Type V cement.

Ultimately, pozzolan was added as a separate ingredient to a cement essentially meeting Type V specifications. Many manufacturing problems were encountered and overcome especially regarding spinning time and curing. Other contractors complained of the "stickiness" of a 25 percent pozzolan replacement concrete, but these problems were also surmounted.

Mr. McLean reported that thus far the District has been extremely pleased with the results of the installation. Infiltration has been about 14 percent of the allowable, alone resulting in an annual saving of \$2400. Because of the extended curing period he suggested that physical acceptance tests of each lot of pozzolan should be made to be certain that the potential strength of the material will be developed within the specified time.

### Concrete Pipe Culverts

R. Robinson Rowe, in his paper on concrete pipe culverts in California's expanding highway program, spoke primarily on their current and prospective demand for pipe and specials and on the relation of that demand to cost as well as on the effect of the geography of the State on cost and demand. He also touched on novel uses of pipe and suggestions for standardization.

He pointed out that the prices for pipe vary over wide limits from job to job depending on a number of factors such as length of haul, the time of the year, the contractors know-how. Actually, he said, the price is usually the random bid on pipe by the low bidder on earthwork and pavement. Mr. Rowe computed a weighted average for the cost of pipe for the years of 1949 and 1953. The increase was about 24 percent which was the same as the *Engineering News-Record* construction index increase over the same period.

His figures on awards granted in those particular years show an increase of 88 percent in lin. ft. of concrete pipe used and an increase of 135 percent in value. This might indicate a trend toward large diameters. The future, he said, should show a corresponding increase in quantities used.

Mr. Rowe said that figures indicate that the highest prices are paid near the largest sources of supply in metropolitan areas. This, he said, may be due to storage and working space limitations and the use of the pipe for water and sewer lines as well as culverts.

Mr. Rowe said that the tendency



Members and guests of the Technical Problems Committee. Left to right: David A. Decker, R. C. Longfellow, W. E. Rodes, H. H. Tormey, Louis F. Dolch, R. A. Normann, E. F. Bessalov, J. G. Hendrickson, Jr., Harold W. Chutter and Claude Kelley

is toward longer lengths of concrete pipe. The former designs were adapted to multiples of 2.5 ft., 3 ft. and 4 ft., whereas they have now changed to 8 ft. He also called for more thought on the matter of furnishing perforated pipe for which there is a large demand but practically no supply. Another item he said he hoped to see available in standard sizes and designs is the end transition which, so far, has been limited to sizes up to 36 in. in diameter in his area.

Mr. Rowe told of an unusual application of concrete pipe to bridge construction where voids in a 3-ft. thick hollow slab deck were formed with 1827 lin. ft. of 24-in. plain concrete pipe laid with unsealed joints in rows 40 in. apart. He said that paper tubes have been used in thinner slabs, but that concrete pipe assured against collapse and simplified the placement of reinforcement.

The industry panel for the Saturday afternoon "Jam Session" was moderated by Harold W. Chutter, Jourdan Concrete Pipe Co., Fresno, Calif. Members of the panel were: George B. Denham, Faulkner Concrete Pipe Co., Hattiesburg, Miss.; George P. Duecy, Associated Sand and Gravel Co., Everett, Wash.; J. A. Dunn, Hume Pipe of New England, Inc., Swampscott, Mass.; Fred Spiekerman Ed. Spiekerman Concrete Pipe Co., Lodi, Calif.; and Harry H. Tormey, Jahncke Service, Inc., New Orleans, La.

They discussed several questions from the floor among which were the use of cores to determine compressive strength, a reasonable maximum infiltration allowance in completed pipelines and pozzolans such as Mr. Davis had discussed.

The American Concrete Pipe Association announced that it will hold its 1955 convention and meeting in Boston, Mass., during the latter part of February or in early March.

### Changes in Ownership

NAPOLEON SAND & GRAVEL CO., Napoleon, N. D., has been purchased by Vance E. Kroeber from Walter C. Brown, who has purchased Mr. Kroeber's interest in Western Concrete Products Co., Bismarck, N. D., which was established last summer by Mr. Brown and Mr. Kroeber.

### Silica Flour Tests

(Continued from page 215)

studies separately made show that the rate of absorption for the autoclaved product is less than for the normal cured material.

As a general statement, satisfactory high-pressure curing is accomplished at pressures in the range of 100 to 125 p.s.i. (gauge). There appears to be no economic gain in going to pressures above 125 lb. Saturated steam is required. Superheat should be avoided. The time of pressure application and its uniform maintenance have an important bearing on the strength developed. The strength increase is very rapid during the initial 8 to 10 hr. at pressure used, and while it continues to increase thereafter, the rate is so low that the additional time is not justified. After about 10 hours time, the rate of gain is on the order of 1 percent or less per hour. Autoclaving should preferably be delayed until the portland cement in the product has attained its normal final set. No adverse effects have been isolated by the writer for pre-cure times extending as long as eight days, if the product is not subjected to excessive drying during that period. A typical time vs. strength curve is shown in Fig. 3.

W. J. Shore states that producers of autoclaved block have increased the number of block per barrel of cement by as much as 50 percent, while maintaining the strength called for in the usual specifications. He states that this permits a material saving of about \$13,000 per million 8-in. block. (ROCK PRODUCTS, June 1953, page 204).

Autoclaving results in an altered material, rather distinct from ordinary hydrated portland cement. It is generally considered that the high pressure cured material has a dimensional movement of about 50 percent that of the air-cured. A factor frequently not considered is that both the air-cured and the atmospheric steam cured products have a long continuing progressive permanent shrinkage that develops with repeated cycles of wetting and drying such as occur in the usual building walls.

The autoclaved material is almost wholly free of progressive increasing shrinkage, in addition to its better stability under wet to dry changes.

# Concrete Taking Larger Cut of Construction Market

**American Concrete Institute 50th annual convention points to new designs, methods and improved materials as factors in ever widening market for concrete**

**K**EENER COMPETITION between building materials and the latest in technical developments were shown to be closely related to the progress of the concrete industry in the big 1954 construction market at the American Concrete Institute's golden anniversary convention. Held at the Shirley-Savoy Hotel, Denver, Colo., February 22-26, the 50th annual convention drew close to 800 registrants. In commemoration of 50 years of service to the industry, one session was devoted to appraising the concrete industry—past, present, and future.

The 1954 construction market was viewed optimistically by Norman P. Mason, chairman, Construction and Civic Development Department Committee, Chamber of Commerce of the United States. Based on an assumption that the country's general economy will closely approximate last year's volume, with a possible drop of not more than 7 or 8 percent, Mr. Mason predicted that the construction industry will come close to the \$34,-720,000,000 goal achieved in 1953.

Rear Admiral J. F. Jelley, (CEC) USN, Director of Construction, Department of Defense, and formerly head of the Bureau of Yards and Docks, took a more detailed look at one phase of building. Keener competition between various construction materials is to be expected, he said, making proper selection of materials essential.

Concrete is often sold on the basis of low upkeep and long life, but only by adequate cost data can it be proved in a competitive market that concrete will save money over the life of the facility, Admiral Jelley warned.

## U. S. B. R. Use of Concrete

The next two speakers at the special session described the use of concrete by two of the largest construction agencies of the United States, the U. S. Bureau of Reclamation and the U. S. Army Corps of Engineers.

W. A. Dexheimer, Commissioner of Reclamation, U. S. Department of the Interior, noted that although outstanding advances have been made in concrete technology during recent years, there are still many opportunities remaining for improvement.

"Objectionable cracks still appear in our structures. There are a few unexplained instances of rapid deterioration. The resistance of concrete to

abrasion, chemical attack, and frost action might be improved. Frequently false or premature set hampers placing operations. Our construction methods might be improved to reduce cost and improve quality," he reminded the audience.

As the Bureau of Reclamation's principal construction material, concrete of good quality is of more than academic concern to the Bureau, said Mr. Dexheimer. The Bureau has placed, on the average, more than 2,000,000 cu. yd. of concrete for each of the last 20 years.

Most of the Bureau's yardage is in structures of unusually large dimensions. He noted that the problems encountered in mass concrete construction have given rise—with the able help of the cement industry—to the development of special cements. Also, revelations of the composition of portland cement, and of the contributions of its constituents to strength and heat of hydration, permitted realistic control of temperature rise and troublesome volume changes in mass concrete. Better understanding of the behavior of concrete and greater confidence in test results have made possible, he said, the use of smaller sections and less cement in recent dams built by the Bureau.

Mr. Dexheimer also described some of the work by the Bureau's laboratories in helping to develop new tech-



M. A. Swayze, left, director of research, Lone Star Cement Corp., inspecting a sample of aggregate with A. G. Timms, senior materials engineer, Bureau of Public Roads, Washington, D. C.



Henry L. Kennedy, left, retiring president of A. C. I., congratulates Chas. H. Scholer, the new president

niques and basic concepts in the art of concrete construction. He also noted that the Bureau has installed more than 1200 miles of precast concrete pipe to date. Precast pipe of the cylinder type have been installed for operation under hydrostatic heads as high as 650 ft. Interest in prestressing has led to the use of this technique in bridges.

Use of sulfate-resisting cement, he said, minimizes costly repairs and defers replacement of concrete which deteriorates under the attack of alkaline soils or water. He also believed that the conquering of the alkali-aggregate reaction problem now saves millions of dollars every year. The same is true, he noted, as a result of the use of air-entraining agents for improved workability and durability of concrete.

Major General S. D. Sturgis, Jr., Chief of Engineers, U. S. Army, closed the session by reviewing what the Corps of Engineers is doing as it affects concrete. The Corps is placing a lot of concrete, both at home and abroad, and is likely to continue to do so, he predicted. The civil works program totals about \$525,000,000 this fiscal year; a military construction program, world-wide in scope, totals more than \$4½ billion.

As a partial indication of the importance of concrete in the Corps of Engineers' civil works program, Gen. Sturgis mentioned that more than 25,000,000 cu. yd. of air-entrained concrete have been placed by the Corps in major civil works structures since 1944.

## Technical Sessions

One day of the convention was devoted to A.C.I. technical committee meetings. More than 25 committees or sub-committees met to discuss a wide range of subjects, including prestressed and precast concrete, curing, vibration, volume changes and plastic flow, high-pressure steam curing, lightweight aggregate concrete, residential concrete work, and others.

The general technical session also covered a wide range of subjects, including the presentation of two new A.C.I. Standards, preview of another

A.C.I.-P.C.A. film, structural design, materials and construction, concrete properties, precast and prestressed concrete, and the annual "off-the-cuff" research session.

The two standards, which now go to letter ballot of the Institute membership, covered concrete chimneys and mix design. Committee 505's report gave criteria for the design and construction of reinforced concrete chimneys. Committee 613's "Proposed Recommended Practice for Selecting Proportions for Concrete" will supersede A.C.I.'s 1944 Standard on recommended practice for the design of concrete mixes. The motion picture, "How to Transport, Place, Finish, and Cure Quality Concrete," was a sequel to the film "Quality Concrete" produced last year by the Portland Cement Association in cooperation with A.C.I., whose Film Advisory Committee passed on the technical details of the film.

Of the technical papers presented, only those believed to be of special interest to ROCK PRODUCTS readers are summarized in the following paragraphs:

#### Cellular Concretes

Rudolph C. Valore, Jr., National Bureau of Standards, Washington, D.C., reviewed the methods of preparing and the physical properties of moist- and high-pressure steam-cured cellular concretes, ranging in density from 10 to 100 lb. per cu. ft. as they have evolved in Europe in the past 30 years.

He described the various processes: preformed foaming, aluminum powder and hydrogen peroxide gas forming processes, and the excess water process. The most economical and controllable cell-forming process he believed was the preformed foaming, which employs hydrolyzed protein foaming agents.

The moist-cured materials described contained portland cement, neat or with sand. Cellular neat cement had adequate strength for structural use at densities above 40 lb. per cu. ft., but the linear drying shrinkage, ranged from 0.3 to 0.6 percent. Cement-sand mixtures had lower strength, higher shrinkage, and higher absorption than lightweight aggregate concretes of comparable density.

The autoclaved materials described contained portland cement or lime and finely divided siliceous materials such as ground sand, fly ash, burned oil shale, and others. Ratios of binder to "pozzolan" ranged from 1:0.5 to 1:4 for cement and 1:1 to 1:6 for lime, depending on the fineness and composition of the binder and siliceous material. Elasticity, thermal expansion, fire resistance, and acoustic properties were also discussed. Compressive strengths cited were 250 to 1000 p.s.i. at 30 lb. per cu. ft., 400 to 1000 p.s.i. at 40 lb. per cu. ft., and 800 to 3000 p.s.i. at 50 lb. per cu. ft. Flexural strengths were one-fifth to one-third of the compressive strengths.



R. F. Blanks, to the right, vice-president and general manager, Great Western Aggregates, Inc., Denver, being interviewed by Dale Morgan of radio station KFEL

Drying shrinkage ranged from 0.01 to 0.10 percent. Water absorptions were 20 to 50 percent, by volume.

Mr. Valore reported that thermal conductivity was a function of density from 70 to 10 lb. per cu. ft. regardless of composition, cell-forming process, or curing.

#### Precast and Prestressed Concrete

Mass production of prestressed concrete units that will meet or beat competition of other building materials in the open market is not a simple procedure easily mastered by either engineer or manufacturer, pointed out Orley O. Phillips, president, Phillips, Carter, Osborn, Inc., Denver, in his talk "Practical Aspects of Plant Produced Prestressed Concrete."

By recounting the history of the development of the plant of Prestressed Concrete of Colorado, Inc., in Denver, he impressed upon the audience the importance of careful planning.

Mr. Phillips believed that the pretensioning method was the most adaptable to mass production of prestressed concrete members for spans up to about 40 ft. For spans exceeding that, he felt that members could best be fabricated by post-tensioning.

The casting beds used at the plant are 300 ft. long and 10 ft. wide, with intermediate and anchorages spaced at 20-ft. intervals. The tensioning equipment has a 300-ton capacity which can tension up to sixty  $\frac{3}{8}$ -in. or forty  $\frac{1}{2}$ -in. strands in one operation.

Mr. Phillips reported that due to the dry mix being used (seldom exceeding a 1-in. slump), a concrete block plant type of mixer has been found more satisfactory than the drum type. He said that the Denver operation gets a high early strength concrete by using a very dry mix and steam curing. Using only standard Type I portland cement, they obtain a minimum compressive strength of 6000 p.s.i. in 24 hr. This, coupled with efficient operation, allows the casting of new members on each bed each day.

#### "Portable" Precast Concrete Hangar

An effective illustration of what can be done in building up a large structure from small precast concrete elements was depicted in the description of a 130-ft. precast clear-span hangar, 160 ft. long, recently completed for the Royal Canadian Air Force.

Otto Safr, consulting engineer, Vancouver, B.C., Canada, in describing the hangar, said that an unusual requirement for the concrete structure was that the whole of the superstructure can be disassembled and re-erected at a different location to meet changing military needs. In addition, the structure is capable of being erected in northerly areas which permit outside building operations only during a short season.

#### Precast Sandwich Panels

The same session included a discussion on sandwich-type precast concrete construction by F. Thomas Collins, consulting engineer, San Gabriel, Calif.

The precast panels consist of two faces of relatively thin, high strength, high density concrete faces bonded to a core of relatively thick low density material. The core material stabilizes the thin faces of high strength concrete and provides a high stiffness factor for the combination by separating the faces. This combination, said Mr. Collins, produces a lighter, stronger wall; if the core material is a good insulator it also produces a more insulated wall.

The various types of sandwich materials used in concrete panels includes cellular glass insulation, plastic, foam concrete, compressed and treated wood fibers in cement, and lightweight concrete using vermiculite, perlite, pumice, and expanded slag and shale aggregates.

#### Air-Entrained Concrete

The session on materials and properties produced several concepts that are new to the concrete industry.

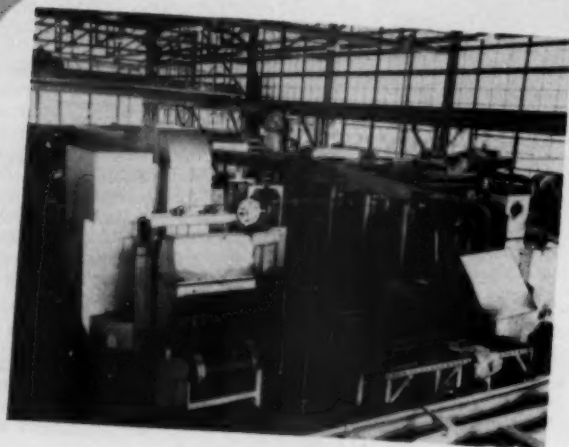
T. C. Powers, manager of basic research, Portland Cement Association, Chicago, Ill., presented a new approach to the problem of air entrainment in concrete in the paper "Void Spacing as a Basis for Producing Air-Entrained Concrete."

Mr. Powers gave new data and analyses showing the relations between the resistance of concrete to frost action and various factors which can be measured directly or computed by approximate equations. He described methods by which it is possible to design a concrete in which the paste has a predetermined resistance to frost action.

Basic studies show, said Mr. Powers, that the function of entrained air is to protect the paste and that the effectiveness depends on the distance from void to void in the paste.

(Continued on page 224)

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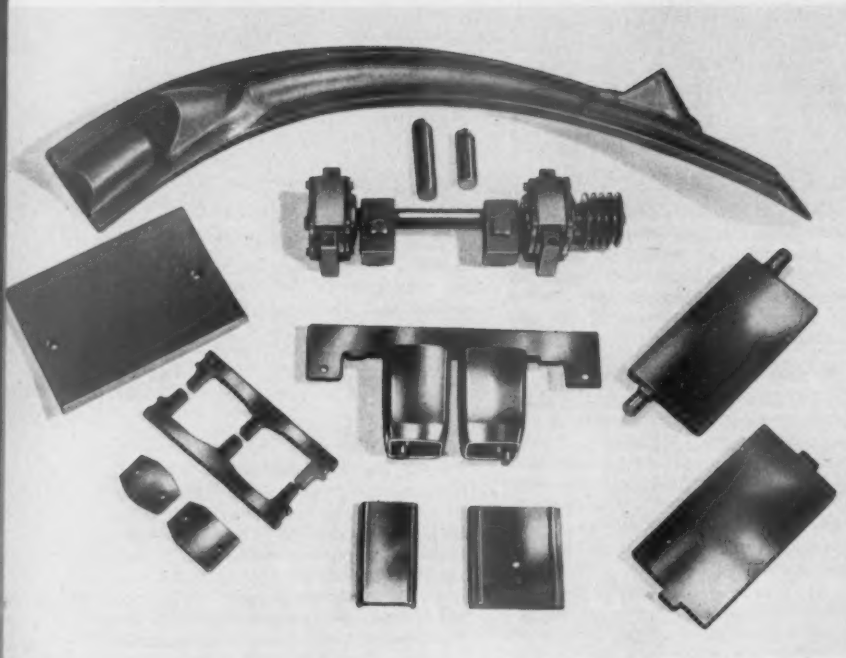
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## Concrete Masonry Progress

Freezing and thawing tests have shown different mixes to have nearly equal frost resistance when the spacing factor is near 0.01 in. The amount of air required for a given spacing factor is directly proportional to the paste content and is greater the smaller the specific surface of the air voids, Mr. Powers pointed out.

The void system is made up of relatively coarse natural voids and entrained bubbles. Characteristics of natural voids vary with aggregate grading, consistency, and other mix characteristics. He went on to point out that with a given amount of air-entraining agent in the mixing water, the amount of entrained bubbles is smaller the greater the quantity of cement or other fine solids in the water.

Mr. Powers believed that complicating the production of air-entrained concrete by trying to maintain a fixed total air content under all conditions is not technically justified. He believed that the next step in refining the production of air-entrained concrete might be the adoption of a void-spacing factor as the basis for specifying and controlling air-entrained concrete.

He then outlined a procedure for designing a fixed spacing factor. The amount of air required to produce a given spacing factor, he said, depends on two independent variables: (1) paste content and (2) specific surface of the voids. Examples were given to show how the formulas applied to typical concrete mixes.

### Drying Shrinkage of Concrete Block

A tentative theory to explain drying shrinkage of concrete block was presented by George L. Kalousek, Research Division, Owens-Illinois Glass Co., Toledo, Ohio, in the paper "Fundamental Factors in the Drying Shrinkage of Concrete Block."

Shrinkage of concrete block dried to stable condition successively at humidities of 85, 70, 50, and 25 percent relative humidity (R.H.) was not always related to moisture loss, he reported. In one series of tests, block underwent slight expansion for a time while losing moisture at 70 percent R.H. Sand and gravel block dried at 25 percent R.H. showed no expansion during rehumidification at 50 and 70 percent R.H. although up to 17 percent of the total moisture content was re-adsorbed.

Measurements of apparent surface areas by water vapor and nitrogen adsorption suggested a clue as to the mechanism by which water caused volume changes in concrete block, said Mr. Kalousek. Approximately twice as much water as nitrogen, expressed in terms of surface areas, was adsorbed by the monocalcium silicate hydrate of the tobermorite series, and also by autoclaved and normally cured block. Xonotlite, also a hydrous monocalcium silicate, which, on the other

hand, undergoes comparatively small drying shrinkage, showed nearly the same surface area for both adsorbates. This and other considerations were interpreted by Mr. Kalousek as indicating that the water producing drying shrinkage may be accommodated in the atomic structure and was designated as "inter-layer" water.

The amount of this excess water, he said, was about 0.7 times as large for autoclaved units as for normally cured units. Since the autoclaved block showed a shrinkage about 0.6 times as large as that shown by the normally cured ones, Mr. Kalousek suggested that the amount of shrinkage may be proportional to the amount of the "inter-layer" water. The volume changes with adsorption and desorption of water, at least at moderate to low humidities, could be caused by the change in size of the unit cell of the structure of the cementitious phase.

### Water Content of Concrete

In the paper "Method for Estimating Water Content of Concrete at the Time of Hardening," James S. Blackman, associate professor of engineering mechanics, University of Nebraska, Lincoln, Neb., presented a rather ingenious idea, and examples and discussion indicated its applicability.

Tests and investigations of existing structures frequently present the necessity for determining the amount of materials originally used in the concrete. The construction record traditionally shows the amount of cement and aggregate, but much less frequently the amount of water used. There is also the possibility that extra water was added to the concrete sometime before final placement.

Professor Blackman has come up with a possible solution of this prob-

lem and presented a method where the original water content at the time of hardening can be determined for most concretes with reasonable accuracy.

### Admixtures

W. T. Moran, chairman of A.C.I. Committee 212, gave a preview of a forthcoming report on admixtures. The committee has classified admixtures into 11 groups: (1) accelerators, (2) retarders, (3) air-entraining agents, (4) gas-forming agents, (5) cementitious materials, (6) pozzolans, (7) alkali-aggregate expansion inhibitors, (8) dampproofing and permeability reducing agents, (9) workability agents, (10) grouting agents, and (11) miscellaneous.

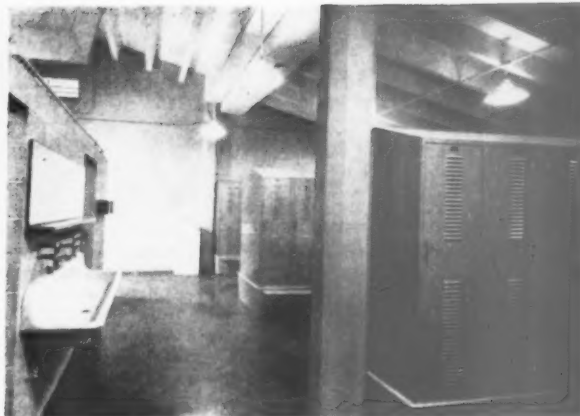
The five-day convention also featured a special Anniversary Dinner at which Rear Admiral Joseph F. Jelley was the main speaker, with noted industry leaders present. The annual research session was held out at the Bureau of Reclamation Laboratories at the Denver Federal Center.

### New Block Association

THE KANSAS CONCRETE MASONRY ASSOCIATION was recently formed at Salina, Kan., by Kansas concrete products manufacturers. About 25 manufacturers attended the organizational meeting at which Ray Browning of Capitol Concrete Products Co., Topeka, Kan., was named president. Roy Frankhauser, Masonry Products Co., Garden City, Kan., was named first vice president; R. J. Schmitt, United Cement Products Co., Wichita, Kan., second vice president; Lyle L. Morgan, Salina Concrete Products Co., Salina, Kan., secretary; and Otis Walker, Concrete Products Co., Junction City, Kan., was named treasurer. The association has applied for a non-profit state charter.



New Officers of Kansas association. Seated, right to left: President, Ray Browning, Capitol Concrete Products, Topeka; Vice-president, Roy Frankhauser, Masonry Products Co., Inc., Garden City. Standing, left to right: Lyle L. Morgan, secretary, Salina Concrete Products, Inc., Salina; Otis Walker, treasurer, Concrete Products Co., Junction City; and R. J. Schmitt, vice-president, United Cement Products, Wichita



Left: Exterior of air-conditioned, windowless change house. Right: Interior of structure which was built entirely of concrete

## Build Air-Conditioned Change House

RIVERSIDE CEMENT CO., Los Angeles, Calif., has completed at its Oro Grande plant near Victorville, Calif., a modern change house designed by the Los Angeles architectural firm of Allison and Rible, to provide air-conditioned and ventilated locker, shower and toilet facilities for more than 300 workers.

Constructed almost entirely of concrete in various forms, the windowless structure cost \$95,000. Columns, girders and joists were cast on the ground and lifted into place by means of cranes. The same procedure was followed with wall "tilt-up" panels, which are specially textured. Wall columns were poured after the wall sections were in place, giving a homogeneous panel construction about 6½ in. thick. The columns were 5½ in. deep.

Although the sections may appear to be thin, additional strength was gained by close control of construction techniques and by the use of steel reinforcing. Specially designed lips on the edges of the roof joists supported the forms which permitted pouring the diaphragm roof slabs without the aid of additional shoring or supports. The forms were removed when the roof was completed. Walls of the main building are composed of poured concrete panels while the walls of the smaller adjoining building for superintendents and foremen are formed of concrete block with alternate 4-in. and 8-in. thicknesses. Exposed exterior columns were poured into pressed paper forms, while most larger members were cast in wooden forms.

Weights of the precast members varied from 1500 lb., the approximate weight of a roof joist 19 ft. long, 5½ in. thick and 14 in. high, to 8 tons, the approximate weight of a 10- x 10-ft., 6-in. thick wall panel.

Exhaust fans on the roof extract roughly half the air from the building, expelling it into the atmosphere. The other 50 percent is recirculated by the heating and ventilating system.

By being located in the ridge, the exhaust fans are able to catch most of the hot and steamy air.

## Improving Masonry Surface

A LIGHT SANDBLASTING TREATMENT for improving the texture and color tone of concrete block walls, either interior or exterior, has been developed by Mac Isaac and Menke Co., general contractors, Los Angeles, Calif. The method was developed by the company while doing construction at the Maywood, Calif., plant of Consolidated Western Steel Co.

Exterior walls were erected with block made of volcanic lava aggregate with a slight reddish cast, grayed down by the cement binder. A light sandblasting of the completed wall resulted in exposing the red aggregate slightly, giving a new depth of color tone and improved richness of texture. The treatment is also said to enhance the appearance of concrete block made from other types of aggregates.

The cost of surface finishing by this method was found to be slightly higher than painting because of the necessity of applying waterproofing to the brick after blasting, but the improved appearance was said to more

than offset the additional cost. The cost of blasting each 1200 ft. unit of surface was said to be about \$100, plus about \$60 for waterproofing the area. Blasting time for each 1200-ft. unit was 5 hr.

For best results it was stated that the nozzle man should be an experienced sandblaster. The handling of the nozzle must be adapted to the density of the surface encountered, and care must be taken not to damage the joints. Blasting at the Maywood plant was not attempted until several days after the wall was constructed, to allow time for proper setting of the mix. The blasting process was accomplished in two steps: A preliminary light blasting where both soft and hard spots showed up in contrast; and a second blasting over the hard areas which smoothed out the work. The waterproofing application was done by spraying, to flush the repellent thoroughly into the rough texture developed by the blasting.

## Truck Mixer Standards

THE NATIONAL READY MIXED CONCRETE ASSOCIATION has announced the publication of a bulletin entitled, *Standards for Operation of Truck Mixers and Agitators of the National Ready Mixed Concrete Association*. The bulletin presents the latest revisions in the association standards, providing that the volume of the batch may be increased by 10 percent over the normal rated capacity of 57.5 percent of the drum or container volume, provided such increased capacity is guaranteed by the manufacturer and, further provided, that the minimum amount of mixing shall be 70 revolutions instead of the 50 required for batches of normal rated capacity. The increases in capacity are supported by the survey of truck mixers conducted by the association during the summer of 1952. A preliminary report of that investigation was submitted at the annual meeting in San Francisco, in February, 1953, and a final report was submitted at the annual meeting in Chicago, in February, 1954.



Deeper surface texture and improved color tone of the concrete block are accomplished by a light sandblasting of the completed wall

# NEW MACHINERY

## Telescoping Fork Truck

ELWELL-PARKER ELECTRIC CO., 4205 St. Clair Ave., Cleveland 3, Ohio, has brought out a 10,000-lb. capacity, electric-powered, hydraulically-operated



Electric-powered, hydraulically-operated truck fork truck. It has front wheel drive, rear wheel steering, and is designed for tiering with telescoping lift, and tilting. The hoist frame consists of a single low-pressure simplex hydraulic cylinder. Combination worm and spur gear drive is employed, and a fully articulating caster type trailing axle permits maneuverability and easy steering. The hoist speed for a full load is 15 f.p.m. up and 35 f.p.m. down. Without a load, the speed is 30 f.p.m. up and down, and the truck travel speed is 4 m.p.h. with a load; 15 m.p.h. without a load.

## Concrete Mix Selector

C. S. JOHNSON Co., Champaign, Ill., has announced the 120-mix selector, a push-button control panel which enables an operator to produce 120 different quantity and type concrete batches. A "repeater" mechanism automatically provides for rebatching



Mix selector produces 120 size and type concrete batches

of the initial batch to make up the full mixer charge. The selection mechanism is electrically controlled, and is to be installed under a multiple compartment aggregate and cement bin. A mix number indicating-wheel and a hand wheel on the right side of the control cabinet facilitate the various "mix" selections. The master wheel positions the selector wheels, one for each aggregate, setting the cut-off weight for each. Accurate weighing is assured through the use of micro-switches as cut-off devices. The hand wheel has a positive lock to prevent accidental change of the selection during batching, and is designed to enable the operator to shift quickly from one mix to another. Automatic single material batchers on each compartment are controlled by the central dial scale unit with pens recording the weight of each single material batch. A water batcher, a cement batcher, and provision for automatic moisture compensation of the sand complete the setup.

## Transit Mixer Units

LE ROI Co., Transo Div., 1706 South 68th St., Milwaukee 14, Wis., has announced seven mixer and agitator models for truck or skid mounting, with capacities ranging from 3 to 6½ cu. yd. A planetary type reversing transmission, which has self-adjusting, spring loaded clutches running in oil, is utilized to provide smooth

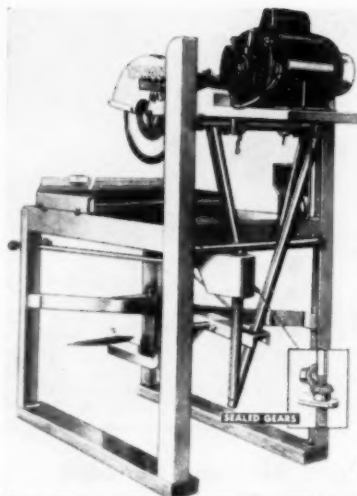


Mixer of 4½-cu. yd. capacity has a two compartment water tank

starting and drum rotation reversal with a full load. Dual mixing, agitating and discharge speeds are featured. The mixers also incorporate built-in centrifugal water pumps and heavy-duty industrial type engines. The direct mixer drive eliminates the need for heavy ring gears and sprockets.

## Masonry Saw

ROBERT G. EVANS Co., 6315 Brookside Plaza, Kansas City 13, Mo., has announced the Target Roll-O-Matic masonry saw which features an operating handle for raising or lowering the cutting head to the exact position required for different size masonry materials. "Safety-Lock" toggle pins are utilized to lock the cutting head in position. The cutting may be ac-



Saw adjusts to position required for different size masonry materials

complished by means of a foot pedal, however, when full depth cutting is desired, the blade is lowered to position and the material fed through without using the foot pedal. Models are available for cutting stone, brick, structural tile, refractories, and for either wet or dry sawing.

## Air Entraining Agent

DASCO CHEMICAL Co., INC., 1602-4 Thames St., Baltimore 31, Md., has developed a concrete air entraining agent known as "Dastrex." It is said to contain no inert fillers, and will mix immediately when applied, therefore requiring less spading and rodding. The product is designed to provide 3 to 6 percent of air entrainment to the concrete.

## Air Hammer

SUPERIOR PNEUMATIC AND MANUFACTURING, INC., 4758 Warner Rd., Cleveland 25, Ohio, has brought out the "Big Bully" air hammer for cleaning mixing equipment, star drilling, cleaning mixing trucks and chipping waste concrete from mixing room floors. The air hammer, which weighs 50 oz., and is 6 in. long, has 28 different tools available for versatile operations.

## Fork Truck Drive

TOWMOTOR CORP., 1226 E. 152nd St., Cleveland 10, Ohio, has introduced the "Towmotorque" drive, designed especially for fork lift trucks. The drive eliminates gear shifting and permits the operator to change from forward to reverse even before coming to a full stop. A "Creep Control" is provided to enable "inching" the truck while the engine operates at high speed to raise a load. Smooth operation at all speeds is also said to be provided by the drive. The clutch and clutch pedal are eliminated, thus providing ease of maintenance as well as control.



Stepanian truck mixer. To the left, truck mixer with conveyor at low angle with swivel discharge chute folded underneath conveyor; to the right, discharge valve open on mixer drum with belt conveyor in low angle position with discharge end extended

## The Story of the Ready-Mixed Concrete Industry

### 19. A producer views the ready-mixed concrete business . . .

**B**ALTIMORE, Md. was the scene of the first delivery of ready-mixed concrete. The year was 1913, shortly before World War I. Concrete was processed at a central mixing plant and hauled in a dump truck. The first concrete to be handled by a truck mixer was delivered in 1926. This epochal event took place on the West Coast in San Francisco. The concrete was delivered in a Barrymore mixer for use in the construction of Children's Hospital. The transit mixer was born in 1926, a year better remembered as marking the collapse of the Florida land boom.

The first truck mixer patent application was filed in 1916 by an Ohioan, Stephen Stepanian of Columbus. Steve, a former president of the National Ready Mixed Concrete Association, is generally considered to be the father of ready mixed concrete. An Association Fellowship at the University of Maryland memorializes his contribution to our industry.

#### Pioneer Efforts

Following the 1916 filing of a petition for a truck mixer patent, Steve was unable to interest his Columbus associates in proceeding with the manufacture of his invention. Shortly thereafter, he was able to make a partnership agreement with a Milwaukee manufacturer, in which it was agreed that the Koehring Mixer Co. would build a full scale model of the machine.

When the first truck mixer to be built came off the line, it was comparatively so heavy that the truck, of very limited power on which the machine was mounted, was just able to support and barely move the empty mixer without adding a pound of concrete. Stepanian's idea was dropped then and there. Undoubtedly a severe handicap to the early acceptance of Steve's "brainchild" was the failure of truck manufacturers to develop, up to that time, any suitable heavy

By JAS. A. NICHOLSON\*

duty trucking equipment. Steve's thinking was ten years ahead of the times.

Steve's patent claims were never granted. In April 1917, the Stepanian application was tentatively rejected by the examiner on these grounds "There is no patentable combination between a 'motor vehicle' and the other elements of each of the claims at bar as neither affects nor modifies the function of the other—It is also not new to mount a mixer with its operating engine on a vehicle, said vehicle also being driven by said engine." The examiner then quoted two previous patents, one in 1895, and one in 1905, as proof of his contentions.

Of course, there were no motor trucks in existence in either 1895 or 1905. The examiners reference was to steam-engine-driven concrete mixers which could be moved about on the job under their own power. Obviously, these steam driven units were not anywhere near the conception of a concrete mixer which could mix and transport concrete from plant to job in a single operation.

In spite of numerous revisions of the patent specifications, the examiner stuck to his guns and Steve never got his patent. On November 4th, 1919, the patent application was finally rejected.

Anyone who studies Steve's original design will see that his unit embodied most of the features of the modern

horizontal drum truck mixer. The mixing drum is mounted on a pivotable bearing behind the cab and the other end of the drum on two rollers, which is still in use. The device included a separate water tank with a gauge, so that the water could be added to the mix at any time. Steve's mixer had a swinging discharge chute which even provided for folding as do many present day mixers.

Although Steve Stepanian never got the royalties and profits that might have otherwise been his, Steve has been accorded lasting universal recognition for his many contributions to the ready-mixed concrete industry. At the 1954 Chicago convention, several thousands stood to honor Steve as he became the second honorary life member of the National Ready Mixed Concrete Association.

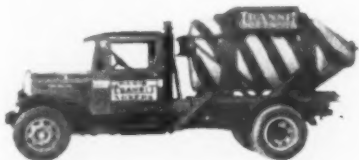
#### Early Plant Operations

Within four years of the original 1913 Baltimore operation, two companies, which still survive, were processing and delivering ready mixed concrete. In the East, The West Jersey Sand Co., later absorbed by The Warner Co., had begun a central mixing operation. From this rather insignificant beginning, Alex Foster, Jr. and the Warner Co. were destined to make great contributions to the development of ready mixed concrete. Throughout the short history of this industry, officers of the Warner Co. have played leading roles.

At the same time in the Southwest, another central mixing operation was getting under way. A former president of the National Sand and Gravel Association, T. E. Popplewell, heads this Texas concern which was and is, The Fort Worth Sand and Gravel Co. (now part of Texas Industries).

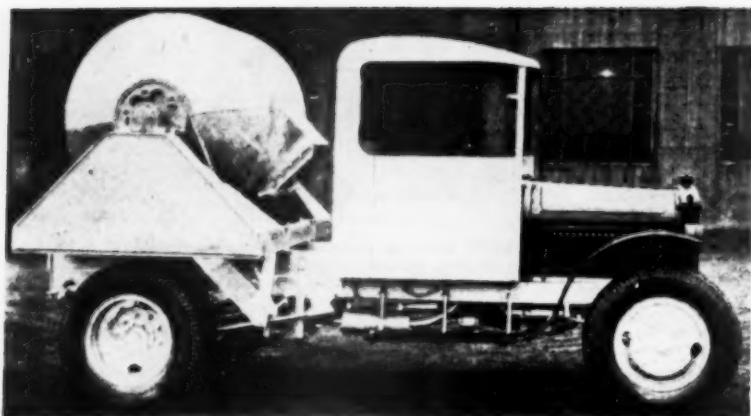
Pioneer central mixing operations were soon started in Milwaukee, Birmingham, Oklahoma City, St. Paul, Cleveland, Kansas City and in many other metropolitan communities.

An early plant, and one of the first



Paris transit mixer, a popular type unit in the early days

\*Pres. Nicholson Concrete Co., Toledo, Ohio



Avril rotating cylinder transit mixer truck manufactured in 1929

commercial ready-mixed concrete operations west of the Mississippi, was built in 1919 by R. D. Farmer of The Western Paving Co. A good many present day concrete producers may be startled to learn that Bob Bremner, now sales manager of The T. L. Smith Co., was the engineer who designed this early Oklahoma City plant layout. In this pioneer operation, materials were measured, not weighed. Plant scales were not yet in use. The plant was equipped with long rectangular shaped vertical chutes, calibrated with slide gates to handle batches of various proportions. Cement, which was shipped by railroad cars in cloth bags, was stacked in a warehouse. An enclosed bucket elevator conveyed the cement to an overhead mixer hopper. As cement was required, cement sacks were opened and the contents dumped into the elevator booth which was located inside the warehouse. Aggregates, supplying both the concrete plant, and the adjoining asphalt plant, were elevated to overhead bins by a 100-ft. derrick, equipped with a 1½ cu. yd. material bucket.

It may be surprising to learn that by 1923, two Oklahoma City concrete plants of The Western Paving Co. were producing in a day's operation, as much as 1000 cu. yd. of central mixed concrete.

At most central mixing operations, plant mixers were of one cu. yd. capacity or less. At a few plants, 3 cu. yd. mixers were being used. Tandem trucks had not yet been developed. At best, single axle trucks, then as now, could legally haul a maximum load of 3 cu. yd.

A rather general practice in the early days of delivering concrete in dump trucks from a central mixing plant was to use a supplementary job mixer to correct any segregation that had occurred in transit. In the 20's this was standard Pittsburgh practice on important work.

#### Development of Equipment

For plant operations, manufacturers were busy vying with one another, in bringing out equipment to weigh materials, measure water and handle

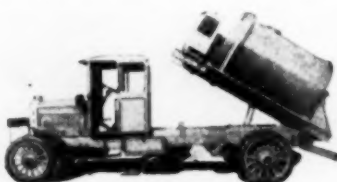
bulk cement. The Erie Steel Construction Co., Erie, Penn., (now Erie Strayer Co.) developed in 1927, its "Aggrometer," a new material hopper that could be used both for weighing and measuring by volume.

In the design of delivery equipment, imaginations were running wild. There were open type jobs and closed bodies, rear and side dumping units, fishtail and V types. The producer had his choice of both low and high discharge. Some units just hauled and discharged the concrete. Other delivery equipment attempted to remix the concrete during discharge. In the East, a type of hauling equipment was developed which did not revolve, largely acting as a conditioner of the concrete. Action on the agitator front was just as rampant. Many of the original agitators were of the dumping type and there were ingenious types of drives to effect this combination.

In the late 20's, the Clinton Motors Corp., Reading, Penn. was offering an exclusive franchise on a delivery unit that guaranteed perfect concrete—a revolving drum unit, equipped with a mixer motor, that dumped to discharge the load. A revolving drum agitator was also being offered by the Portland Concrete Machine Co., Chicago, Ill.

Arthur C. Avril of Cincinnati, in the field of prepared "packaged" concrete (Sakrete) has attained national eminence. Few in the ready mixed industry know that as early as 1929, Mr. Avril had developed an agitator body for handling premixed concrete.

In a review of ready mixed concrete developments, the January 4, 1930 issue of ROCK PRODUCTS had this to say, "The Clinton Motors Corp. has



Another early type of truck mixer was the Clinton

developed probably the most complete line of agitator trucks on the market, including Clintons "Concrete-Conveyor-Conditioner" in 1, 2 and 3 cu. yd. capacities." This unit was made with both a regular and high dump hoist.

In 1925 there were approximately 25 ready mixed operations scattered throughout the United States. All of these were central mixing plants. By 1929, more than 100 ready-mixed concrete plants were in operation. At many of these plants, truck mixers were already being used.

In the fall of 1928, Botzum Bros. of Akron, Ohio announced that it had doubled the capacity of its ready-mixed concrete plant by the addition of two Barrymore mixers. The 1928 officers of this long established Akron firm, (now operating a good sized central mixing plant with agitator deliveries) thought they had things pretty much their own way—with an exclusive Barrymore franchise.

In the summer of 1928, first deliveries of ready-mixed concrete were made in two Barrymore mixers to Boston contractors. The firm which started ready mixed operations was shortly taken over by the Boston Sand and Gravel Co., and The Boston Concrete Corp. was formed. A new central batching and mixing operation was started at a location so favorable that even with the then available trucking equipment, practically all of Metropolitan Boston could be reached in 30 min. Concrete sales were handled only through building supply dealers and quality of the delivered concrete was closely controlled by Thompson and Lichtner Co., Inc., consulting engineers.

Four sand and gravel companies—J. K. Davison and Bros., Iron City Sand and Gravel Co., Keystone Sand & Supply Co., and Rodgers Sand Co.—built a cooperative plant in the heart of downtown Pittsburgh. In 1929 this joint venture was operating nine Barrymore mixer trucks and 21 Bartlett-Snow dump bodies for hauling centrally-mixed concrete.

In 1929, The Ready Mixed Concrete Co., Omaha, Neb., was delivering plant mixed concrete in seven—1½ cu. yd. Chevrolet trucks and three special Mack trucks on which were mounted 70 cu. ft. bathtub type bodies manufactured by the Standard Steel Truck Co., of Kansas City.

The first mixers were open type paddle mixers, working off a shaft, as was the 1926 version of the Barrymore, making its first deliveries to Children's Hospital. Again it was on the Pacific Coast that revolving drum transit mixers made their first appearance. These units gained almost immediate acceptance, and soon were being widely used throughout this country.

The Paris "Transit Mixer" was the first horizontal drum truck mixer to be put on the market. Hugh Paris in Seattle formed the Paris Transit Mixer Co. and in 1927 built about six mixers. In 1928 Transit Mixers

Inc. obtained exclusive rights to manufacture and distribute the Paris units. It was through this transaction that one of the real pioneers, Ray MacLean, president of the Jaeger Machine Co., became actively identified with the industry.

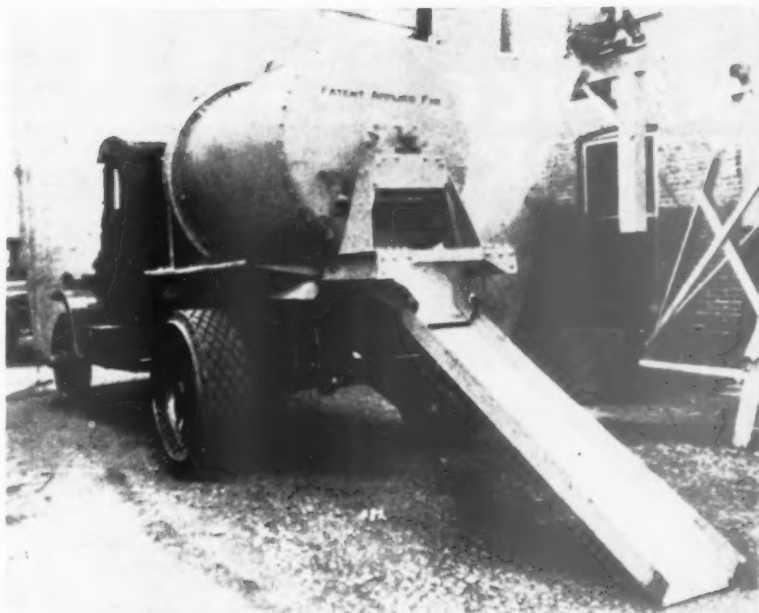
In late 1929 and early 1930, Transit Mixers Inc., the manufacturer of The Paris "Transit Mixer" was carrying full page ads in trade magazines. The "Transit Mix" system had spread so fast that this San Francisco firm had established branches in Chicago, New York and Vancouver, B. C. Plans were being formulated for a national organization by ready-mixed concrete producers who had Paris franchises. In fact, several months before The National Ready Mixed Concrete Association was started, producers using the transit mixed system actually organized their own association with Porter Yett, Portland, Ore., as the president; Charles P. Maloney, Washington, as secretary; and Bruner Penison, Dallas, as treasurer.

A hint of things to come, appeared in the February 1, 1930 issue of *ROCK PRODUCTS*, when The Jaeger Machine Co., Columbus, Ohio, in a full page ad announced in big bold letters—"Now you can Haul, Mix and Discharge Concrete without Hoist on any Truck or Trailer—Old or New." The unit was advertised as a three-purpose body—mixes concrete, handles premixed, hauls bulk materials. The ad featured a picture showing a single axle truck, pulling a trailer, on each of which was mounted a Jaeger mixer. Thus came about the first deliveries of 5 cu. yd. loads. In the same year Chain Belt Co. announced its original truck mixer, the Rex "Mix Haul."

As we look back down the years we see now that the developers of The Barrymore and The Paris truck mixers had golden opportunities to cash in on the sudden growth and terrific expansion of this great new industry. The opportunities were not realized and today the early leading names in this field are only memories. Their eclipse was due not alone to their own failure to effect strong manufacturing and merchandising programs.

### Phenomenal Growth

In 1930 three manufacturers of concrete mixers, feeling the impact of ready mixed operations on the sales of job mixers, brought out the horizontal axis, revolving drum transit mixer, a type which is still in common use. The success of the new units was phenomenal. A full line of truck mixers and agitators was aggressively introduced. The drive was on. As shown by figures released by N.R.M.C.A., an almost unbelievable story of expansion took place between 1932 and 1951. By 1941, 703 commercial ready mixed plants were being operated in 442 cities and towns. Their combined production was in excess of 12,000,000 cu. yd. of concrete. By 1951 there were approximately 1700 plants operating in 1325 cities and areas



An early truck mixer made by Portland Concrete Machines Co., in Chicago

which had an annual production of at least 50,000,000 cu. yd. By 1951, annual sales of transit mixers to the still comparatively new industry, had reached to an amazing total of \$30,000,000.

In 1951 Stephen Stepanian was still active in the Ready Mixed Concrete Industry—both with his company, The Arrow Sand and Gravel Co., of Columbus, Ohio and in association affairs. In the business life of this leader, the ready mixed industry had grown to the position where it was using more than 30 percent of the cement produced in the United States. In his time, ready mixed concrete had become the cement manufacturer's most important customer. In a short span of years, ready-mixed concrete had become big business.

An independent survey indicates that the association's figures are extremely conservative. This survey, and estimates compiled by Bror Nordberg (see *ROCK PRODUCTS*, January, 1954, p. 157) make me believe that 40 to 45 percent of the total U. S. production is now being used in ready-mixed concrete. I would estimate the 1951 production of ready-mixed concrete at 70,000,000 cu. yd. with 1953 as much as 10 percent higher.



Perfect Mix transit mixer operated by Porter W. Yett in Portland, Ore., in 1930

Constantly, other developments were making changes in the industry. Improvements were quickly being introduced in materials handling, scale operation and water measurement. New electrical, air and hydraulic controls made their appearance. Automatic features became common. Devices were developed to make moisture determinations and record slumps. Manufacturers continued to make improvements in truck mixers.

In delivery equipment, the year 1938 produced the first really important change. The firms engaged in the manufacture of transit mixers received a truly big shock. With the introduction of the first high discharge transit mixer, the T. L. Smith Co., Milwaukee, Wis., had become an important competitor. In earlier years, the development of the horizontal truck mixer had brought about the rapid growth of the ready mixed concrete industry. The introduction and prompt acceptance of the high discharge truck mixer also was to quickly change the pattern of things. The mistakes of the early truck mixer developers were still fresh in peoples minds. Mixer manufacturers promptly adjusted their planning to the new challenge. The horizontal drum mixer manufacturers soon began to meet this new competition by producing their own high discharge units.

### National Association Founded

In 1930, even before the advent of the high discharge transit mixer, the still new industry had been accorded due recognition. The February *A. C. I. Journal* contained an article, titled "Proposed Specifications for Ready Mixed Concrete." Miles N. Clair was both chairman of the committee and author of the article. The widespread use and undoubted merits of the new

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**American Cancer Society**



product had been officially recognized by the specification writers. Through convention action of The National Sand and Gravel Association, a Ready Mixed Concrete Division had been created. In May of 1930, at a Chicago meeting of The Concrete Division, a committee on organization was instructed to, "proceed promptly with the necessary steps for bringing into active existence, The National Ready Mixed Concrete Association."

### Eastern Concrete Products Meeting

THE EASTERN CONCRETE PRODUCTS ASSOCIATION held its first annual meeting in Hershey, Penn., November 18, 1953. Greater attention to sales promotion and salesmanship to meet changing conditions, improved quality, "know your costs," promotion of greater use of concrete block in exposed work, uniform standards of delivery practices, and a closer working relationship with the National Concrete Masonry Association were the principal subjects of discussion.

The association reported a steady growth in its membership since its inception about a year ago when six men met at a dinner at the invitation of Harry H. Longenecker, who became the first president of the organization, and Thomas F. Bausman, who became vice-president. The group now consists of 45 active members from eastern Pennsylvania and the Delmarva Peninsula. The association also reported many accomplishments during its first year in the technical field, in the promotion field and in sociability among the members.

The following officers and directors were elected for the coming year: Harry H. Longenecker Building Units, Inc., Primos, Penn., president; T. K. Nitterhouse, Nitterhouse Concrete Products, Chambersburg, Penn., first vice-president; John T. Fizzano, Fizzano Brothers, Inc., Crum Lynne, Penn., second vice-president; H. Melvin Binkley, Binkley & Ober, E. Petersburg, Penn., secretary-treasurer; and Charles E. Alwine, Alwine Brick Co., New Oxford, Penn., J. G. Lewis, Scranton Building Block Co., Scranton, Penn., G. K. Bistline, Carlisle Cement Products Co., Carlisle, Penn., Jack F. Ridgley, W. R. Ridgley & Co., Wyoming, Penn., and Daniel A. Matassino, Continental Block Co., Wilmington, Del., directors. Ira F. Honaman is executive director.

Social activities at the meeting included a trip for the ladies through the Hershey chocolate factory and the Hershey Museum, and a dinner at the Hotel Hershey for the members, ladies and other guests.

### Concrete Products Merger

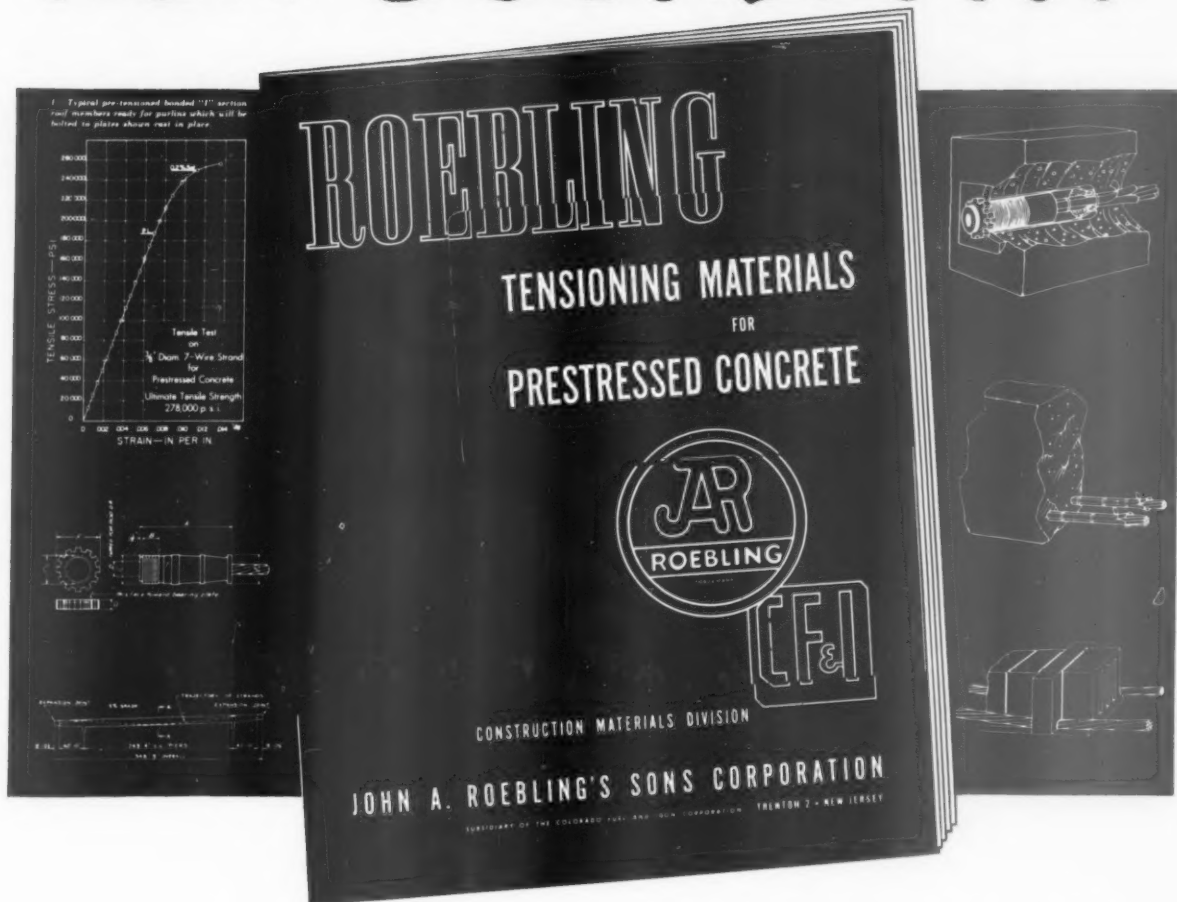
ANNOUNCEMENT was recently made of the merger of six western Washington concrete products firms, namely: Graystone Concrete Products Co., Seattle; Grays Harbor Cement Products Co., Aberdeen; Lewis Materials Co., Centralia; Everett Concrete Products Co., Everett; Graystone Materials Co., Olympia; and Mason Materials Co., Shelton.

Officers of the combined Graystone organization include: W. F. Paddock, board chairman and secretary; F. M. Kettenring, president and general manager; W. S. Wilson, vice-president and general sales manager; R. E. Metzger, vice-president and manager of the Centralia operation; and Mott Rieke, treasurer and controller. New members of the board include A. W. Faragher, W. W. Montgomery and Homer Bergren. R. W. Condon, formerly Seattle sales manager, will become the new manager of the Seattle operation. Other plant managers include W. B. Judah, at Shelton; R. J. Bracken, at Aberdeen; Larry Gourlie, at Everett; and John W. James, at Olympia.



Hopper-bottom dump trailer, used by F. E. Fleming, contract hauler, Parkville, Mo., for transporting Haydite. The Fruehauf trailer is equipped with a tarpaulin, rolled back while loading, which covers trailer in transit to prevent any loss of the lightweight aggregate on a breezy day

# NEW BOOKLET...



## ...time- and cost-saving facts at your fingertips

IN WORDS AND PICTURES, tables and diagrams, here's complete and up-to-the-minute information on tensioning materials for prestressed concrete. It describes Roebling Uncoated Strand for pre-tensioned bonded design, and Anchor Fittings and Galvanized Strand for post-tensioned design.

Other pages describe tensioning elements for post-tensioning; imbedded and block-assembly

applications; properties of High Strength Prestressed Concrete Wire; and recently completed prestressed concrete structures.

Send coupon for your copy of "Tensioning Materials for Prestressed Concrete." Other literature, on design methods and details of tensioning, will be gladly sent upon request. Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, N. J.



# ROEBLING



Subsidiary of The Colorado Fuel and Iron Corporation

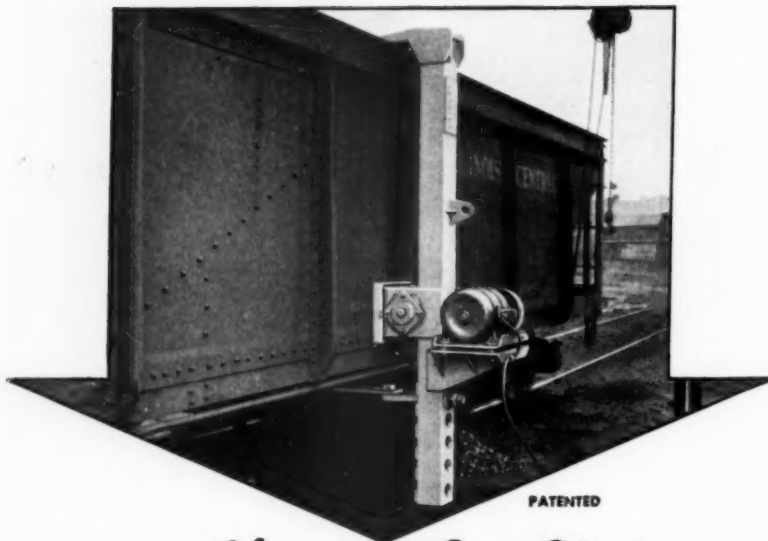
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Gentlemen: Kindly send me a copy of the new booklet "Tensioning Materials for Prestressed Concrete."

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with *National Car Shaker*

Hundreds of National Car Shaker installations have PAID FOR THEMSELVES through big unloading savings. Many users say that they save up to 80% on unloading costs!

One man can unload coal, coke, cinders, sand, stone, aggregates or other bulk materials in a few minutes, under normal conditions. National Car Shaker eliminates the dangerous part of unloading work, as men are not needed in or on cars.



**WRITE TODAY** for full information, prices and descriptive literature on the LOW COST National Car Shaker.

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## ROCK PRODUCTS

THE  
Recognized Authority  
OF THE  
Non-Metallic  
Minerals Industry

### Report of Mortar Tests

THE NATIONAL BUREAU OF STANDARDS has announced publication of Building Materials and Structures Report No. 139, entitled "Studies of Stone Setting Mortars." The report gives an account of studies of several mortars with respect to their bonding strengths to four types of stone; dimensional changes under three conditions of storage; and frost resistance. In addition, it discusses studies of mortars for selection of mortars for use in stone masonry. This 23-page report, which includes 12 figures and 11 tables, is available from the Government Printing Office, Washington 25, D. C., for \$0.20 per copy.

### Ready-Mix Plant

MODERN TRANSIT MIX, INC., a newly organized firm, has announced plans to build a ready-mixed concrete plant on N. Raymond Rd. in Emmett County Mich., near Battle Creek. The new company is headed by F. G. Cheney, who also is head of Cheney Limestone Co., Bellevue, Mich. Gerald Croope, Bellevue, is secretary-treasurer of the new firm.

### Tubing for Prestressing

INTERLOCKING FLEXIBLE TUBING is being used in prestressed concrete construction by Stressteel Corp. In the actual operation, the tubing is fully elongated and cut to a length equal to the bar to allow sufficient tubing to project beyond the forms in order to protect the bar threads and prevent concrete from entering the space between the bar and the tube. The bar is then inserted into the tubing which is positioned in the framework, and the concrete is then poured. After the forms are removed, the tubing is stripped back to the face of the concrete. The prestressing operation follows.

Literature describing the flexible metal tubing used in prestressing construction may be obtained from The Atlantic Metal Hose Co., Inc., 123 W. 64th St., New York, N.Y.

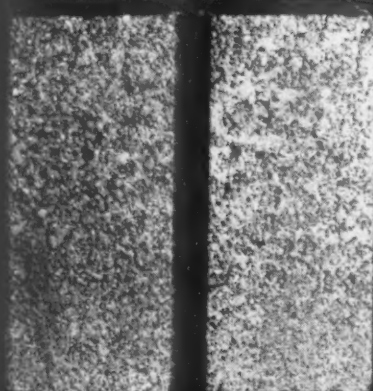


The illustration shows the bars being inserted in the flexible metal hose before the tubing is placed in the framework, the concrete poured, and the prestressing operation performed.

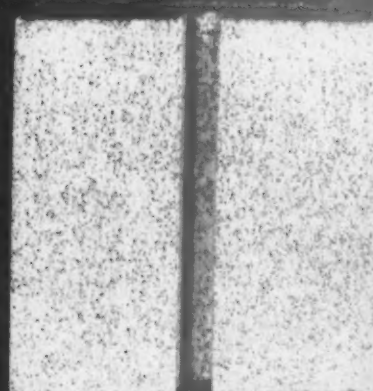
# BETTER

*with low-cost D-40*

## concrete blocks at lower operating costs



This block contains small amount of D-40. It is stronger, has sharper corners and edges, a more uniform texture, is whiter in appearance.



This block is made conventional way — without D-40. Note inferior appearance to block made with D-40.

**Reduced abrasive wear on mixing and molding equipment**  
**Mixes pour into molds faster, "break" cleaner—saves time**  
**Closer bonding—saves on painting and waterproofing**

Let us show you how we have helped other concrete product manufacturers make superior blocks and at the same time reduce their operating costs.

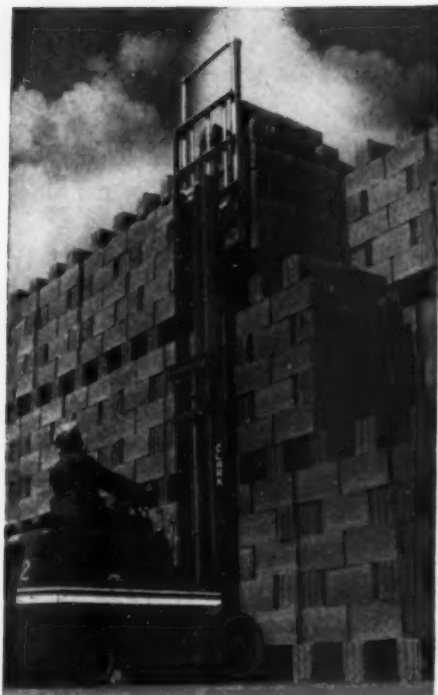
Oronite's ready-to-use additive, D-40, is economical and easy to use. Only one to two ounces is needed per bag of cement. Just add to dry cement at the mixer.

*For complete information, sample and technical help,  
write or call the Oronite office nearest you.*

### ORONITE CHEMICAL COMPANY

38 Sansome St., San Francisco 4, Calif. • 714 W. Olympic Blvd., Los Angeles 15, Calif.  
30 Rockefeller Plaza, New York 20, N. Y. • 600 S. Michigan Ave., Chicago 5, Ill.  
Mercantile Securities Building, Dallas 1, Texas





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Without tying up a penny of working capital, put Clark material handling equipment to work for you. With Clark's pay-as-you-go plan, any of Clark's many models and types of handling equipment is available for your immediate use. With no down payment and at a low monthly cost, this lease plan enables you to:

- 1 Conserve working capital for other essential needs—such as additional inventory, plant expansion and non-leasable capital equipment.
- 2 Pay-as-you-go rental is totally deductible expense.
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No outside financing is necessary—you deal directly with your local Clark dealer who will help you determine what equipment best fits your needs. Gas or electric fork trucks, Powrworker hand trucks, tractors and Clark-Ross carriers—all are available on a 3 or 5 year lease.

Let Clark equipment pay for itself as it cuts your handling costs. Call your local Clark dealer for a discussion of the details which will not obligate you in any way.

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EQUIPMENT**

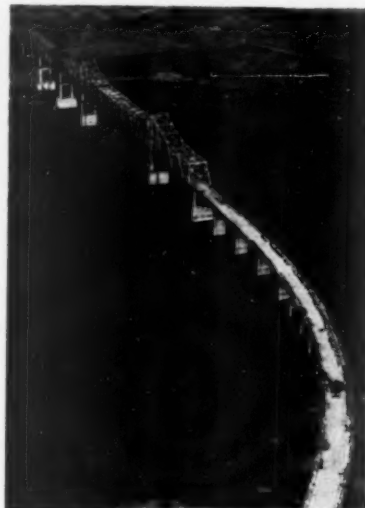
Industrial Truck Division  
**CLARK EQUIPMENT COMPANY**  
Battle Creek 60, Michigan

SEE THE YELLOW PAGES OF YOUR PHONE BOOK  
FOR THE NAME OF YOUR LOCAL CLARK DEALER

### Haydite Concrete Bridge

THE DALLAS BRIDGE, the fourth structure between Pasco and the Pacific Ocean to link the states of Oregon and Washington by spanning the Columbia River barrier, was opened to traffic in December, replacing the former ferry service in operation for the past quarter of a century.

The bridge deck is 3897 ft. long and has an overall width of 31½ ft., with two 12-ft. traffic lanes, one 5½-ft. walk, and a 2-ft. wide curb. The entire length and width of the deck



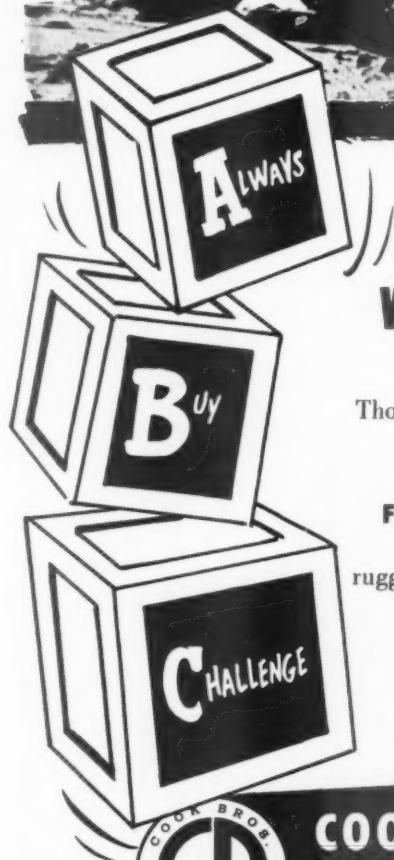
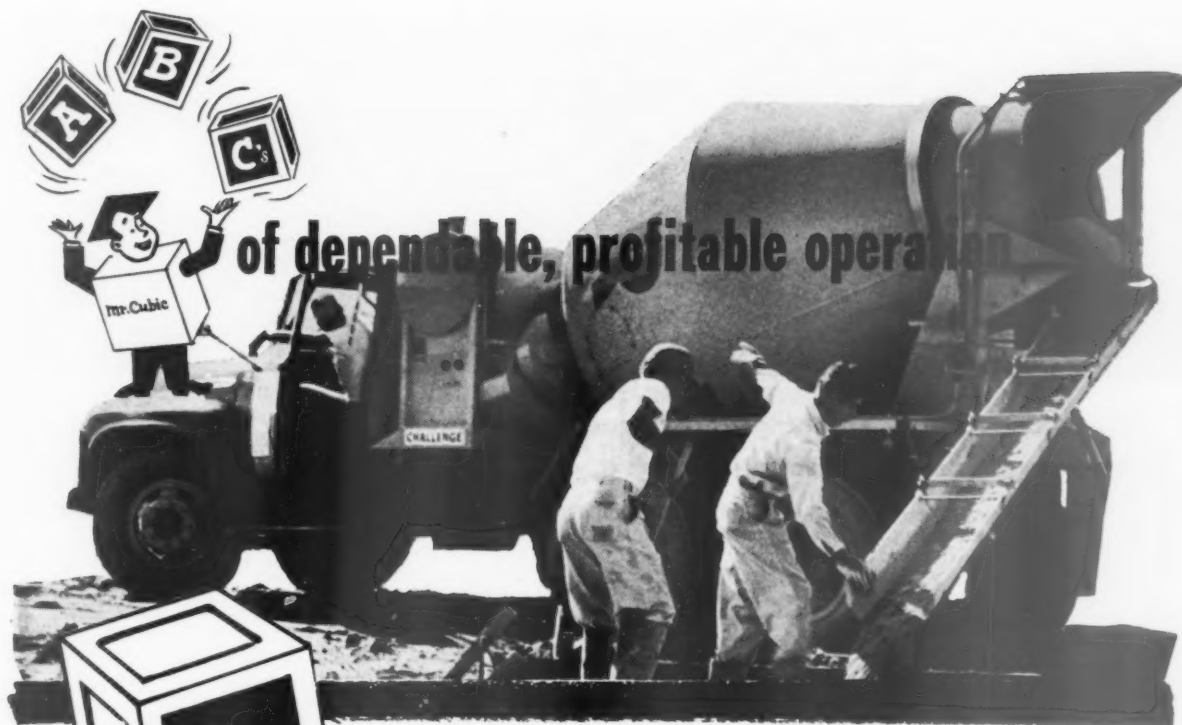
Aerial view of The Dallas bridge, taken from Oregon side, shows nearly completed paving

was constructed of lightweight Haydite expanded shale, which reportedly resulted in reducing the dead load of the bridge by over 3,000,000 lb., which in turn reduced the size of the footings and piers required to sustain the load, as well as effecting substantial savings in the amount and cost of structural and reinforcing steel. The Haydite aggregate was supplied by Smithwick Concrete Products, Portland, Ore.

Numerous compression tests performed during the progress of the job indicated that the requirements of the specifications of 3000 p.s.i. at 28 days were far surpassed, some cylinders well exceeding 5000 p.s.i. in 45 days.

The total contract cost of the bridge and approaches, including electrical work and toll booth, was approximately \$3,450,000. It is estimated that 685,000 vehicles will cross the structure during 1954 and approximately 700,000 during 1955.

YAKIMA CEMENT PRODUCTS CO., Yakima, Wash., has adopted the tradename "Trulay" for its masonry building block, including hollow-core concrete, pumice, red cinder and expanded shale block. The name was chosen from a group of names submitted in a company-conducted naming contest among the company employees.



## WHY TAKE A CHANCE? WHEN YOU CAN DEPEND ON CHALLENGE

### TO STAY ON THE JOB — LESS DOWN TIME

Thousands of Challenge Mixers in all parts of the country operating continuously, week after week, month after month, year after year, give conclusive *proof* of Challenge dependability.

### FOR LOWEST OPERATING and MAINTENANCE EXPENSE

Careful engineering, simplicity of design, plus the use of strong, rugged standard industrial equipment keeps Challenge Mixers operating continuously with nothing more than normal lubrication and maintenance service. Challenge pays big dividends by cutting these costs to absolute minimum.

### FOR LONGER MIXER LIFE

Strength and rugged construction where it is needed . . . a 3/16" high tensile steel drum and a proven, heavy duty drive . . . give Challenge Mixers thousands of hours **MORE** operating life!



**COOK BROS.**  
EQUIPMENT COMPANY

3334 San Fernando Road, Cleveland 6, Ohio  
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Exclusive National Distributor For CHALLENGE  
TRUCK MIXERS...Standard of The Industry

**THE ONLY THOROUGHLY PROVED MODERN TRUCK MIXER**

MEMBER T.M.M.B. N.R.M.C.A.

CONCRETE PRODUCTS, April, 1954  
A Section of ROCK PRODUCTS

**CHALLENGE**  
*Sets The Standard  
For The Industry*



**Blaw-Knox Quick Opening Doors speed production  
of concrete blocks at National Brick and Supply Company**

At Terra Cotta, in Washington, D.C., National Brick and Supply Co. operates one of the most modern concrete block plants in the country.

Eight 120 foot pressure curing chambers are loaded with palletized concrete blocks by fork lift trucks. Blaw-Knox Quick Opening Doors, built for 150 pound operating pressures, are closed and locked securely by a simple, rim-locking mechanism in seconds. These modern curing and handling techniques, plus Blaw-Knox Quick Opening Doors, enable National

Brick to maintain volume production with minimum operating cycles.

Blaw-Knox Quick Opening Doors swing freely on ball bearing davit hinges. They are completely free of bolts, lugs, levers or sliding bars. Easily replaced, self-sealing gaskets are positively sealed by internal pressure.

Blaw-Knox Quick Opening Doors are built for manual or mechanical operation on horizontal or vertical vessels.

Write for Blaw-Knox Booklet No. 2435.



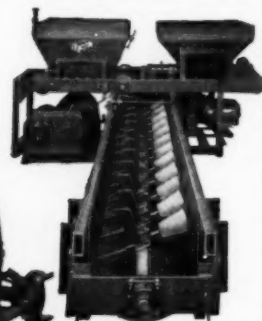
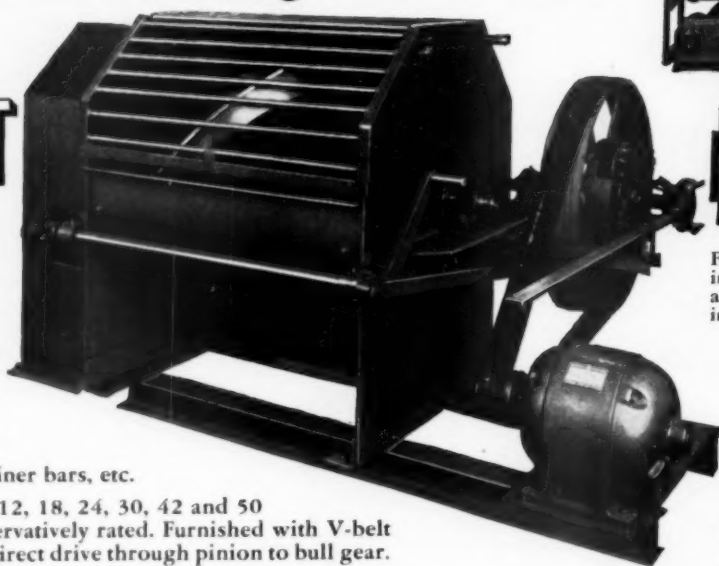
**BLAW-KNOX COMPANY** *Blaw-Knox Equipment Division*  
*Process Equipment Department / Pittsburgh 38, Pennsylvania*

# For Batch Mixing there are **SIX KENT UNITS**

The feature safe loading; correctly designed blades for rapid, thorough mixing; fast, clean discharging; anti-friction bearings with pressure grease fittings; renewable liner bars, etc.

Six sizes available—12, 18, 24, 30, 42 and 50 cubic feet—all conservatively rated. Furnished with V-belt drive, flat pulley or direct drive through pinion to bull gear.

Write us regarding your mixing problems and let a KENT engineer consult with you. No obligation will be entailed.



For thorough mixing in large volume more and more plants are installing

## **KENT Continuous MIXERS**

Materials are fed automatically, proportioned automatically, mixed automatically, discharged automatically and continuously.

Savings are made in first cost, in labor cost, in power cost, in upkeep costs.

*The* **KENT MACHINE COMPANY**

*Manufacturers of Mixers Since 1915*  
**CUYAHOGA FALLS, OHIO**

## Safe Driving Award

CONCRETE MATERIALS, INC., Kansas City, Kan., was recently cited for its outstanding safe-driving record in the past year by Fidelity and Casualty Co. The citation is the only one to be given by the insurance firm among its 651 clients which operate fleets of trucks and cars in the 4-state area of the Kansas City, Mo., branch office. In recognition of its record, the company was awarded a certificate of safety, and pins were presented to the individual employees.

The company operated a fleet of 33 trucks and three automobiles approximately 500,000 miles, with an accident rate of only about one to every 100,000 miles, with no personal injuries involved, compared with five injuries the previous year. Collision losses were 93 percent less in the 1953 period than during the previous year. R. C. Brown, superintendent, attributed the improved record to a safety education program established by the company during the past year. The program includes lectures, moving picture films, and discussions. Employees are not required to attend the monthly safety classes, but those who do receive a small monthly bonus, and an annual bonus for regular attendance all through the year is also given.

## Change in Firm Name

UNIVERSAL CONCRETE PIPE Co., Columbus, Ohio, recently announced the changing of the name of its plant at Grade Lane, Louisville, Ky., from Dixie Concrete Pipe Co., to the regular Universal corporate name. Frank Emch is manager of the Louisville plant, with James Graves as sales representative and Sam Hayes as office manager. Universal, which operates a network of 26 concrete products plants in 12 states, recently became a subsidiary of American-Marietta Co., Chicago, Ill.



New plant of The Southwest Co. at Brownwood, Texas is typical of plants serving smaller cities

**Noted operators in  
Ready Mixed Concrete  
turn to...**

*The new*  
**ROCKET**

**GOELLNER, HAYDEN,  
MAULE, QUILLIAN,  
NELCH, SCHILLING  
—DOZENS MORE!**



## LOOK AT THESE FEATURES!

**Deep-Cut Chute** for fast discharge.

**Hydraulic Chute Control** makes the operator's job much easier, eliminates man-handling entirely!

**Standard Industrial Engines** truck-type transmission—service available at any automobile repair shop.

**Three-Point Suspension** cuts friction to minimum.

**Wear Points** constructed of tough, abrasion-resistant steel!

**Operating Controls** Grouped for ease of operation, accurately controlled discharge.

**Positive Chain Drive** delivers flexible power, not affected by road shock, twisting of truck.

**Removable Inspection Hatch** with leak-proof gasket!

**DEMAND THE BADGE  
OF DEPENDABILITY**



**CONCRETE  
TRANSPORT  
MIXER CO.**

## MAIL THIS COUPON TODAY!

Gentlemen: Please rush me complete prices, literature, and terms on the following:

- ☐ New Rocket Revolving Drum Truck Mixer  
☐ Hi-Lo Stationary Drum Truck Mixer  
☐ Batching Equipment  
☐ Plant Mixers ☐ Water Meters

CP

Name \_\_\_\_\_

Firm \_\_\_\_\_

Address \_\_\_\_\_

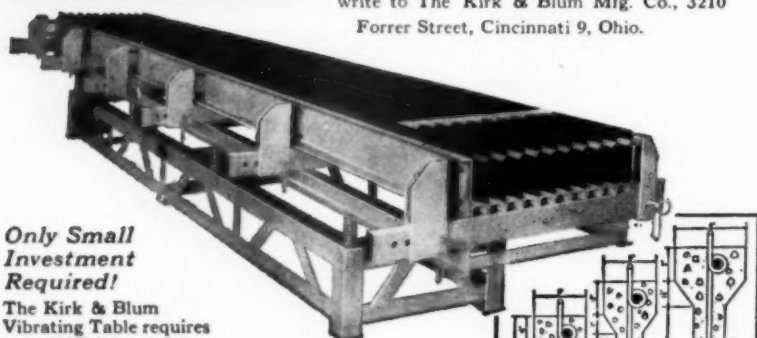
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## Add a New Profit-Maker Increase Your Volume

### PRODUCE CONCRETE JOISTS, LINTELS AND FENCE POSTS with the KIRK & BLUM HEAVY DUTY VIBRATING TABLE . . .

Your experience in the building trade should make it easy to build up a profitable business in this new line. The products are simple to make, have unusual strength, are termite proof. The KIRK & BLUM Type "S" Heavy Duty Vibrating Table is capable of multi-production of concrete joists, allowing a fine profit-margin. Easily produced by unskilled operators. For complete details and prices, write to The Kirk & Blum Mfg. Co., 3210 Forrer Street, Cincinnati 9, Ohio.

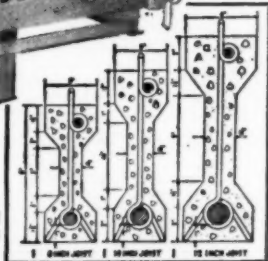


#### Only Small Investment Required!

The Kirk & Blum Vibrating Table requires a small initial cost, lets you make an entirely new line of 8", 10" and 12" joists in 20 and 24 ft. lengths.

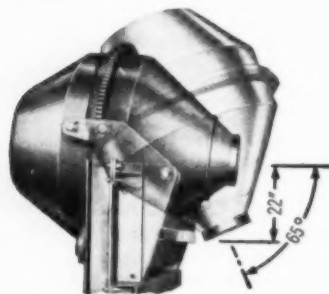
**KIRK & BLUM**

Manufacturers of steel forms of all types . . . Curb, Gutter, Sewer, Road



## Burmeister "TILT-UP" MIXER CUTS PLANT HEIGHT AS MUCH AS 8 FEET

Burmeister's patented "tilt-up" feature—which reduces the mixer's headroom requirement—permits lower plant heights. This means easier crane loading, lower power costs, lower initial costs, less costly "conversions," increased portability, and better over-all control.



● In addition to reducing plant height, Burmeister's 3 cu. yd. "Tilt-Up" Mixer (left) provides a steeper 65° discharge from one spot, eliminates segregation of concrete and the danger of accidental discharge. It is simple to install, and has an integral hydraulic system—no compressor is required. Write for name of your nearest Burmeister Distributor, without obligation.

#### SEND FOR FREE CATALOG

Your copy of Burmeister's new illustrated Catalog is now available. Write today!



COMPLETE PLANTS FROM A SINGLE SOURCE

# Burmeister

L. BURMEISTER CO., 4529 W. MITCHELL ST., MILWAUKEE 14, WISCONSIN



### Curved Wall Construction

GLACIER SAND & GRAVEL Co., Steilacoom City, Wash., is nearing completion of its new sand and gravel storage facilities which involved an unusual concrete construction job. The job consisted of two sharply curving, free-standing concrete walls, 40 ft. high and 15 in. thick. The curves are shaped to a radius of 15½ ft. One wall is 190 ft. long and the other, 400 ft.

The walls are shaped like the curve of an "S" with the inside of each curve serving as a bunker for the storage of sand and gravel. The bunkers will be filled from the top by a system of conveyors, and the sand and gravel will be discharged onto a belt conveyor running inside the 8-ft. dia. reclaiming tunnels.

The curving surface of the walls posed difficult problems in the construction of forms. This was solved by the use of prefabricated fir plywood form panels and scaffold brackets, designed and manufactured by Concrete Forms, Inc., of Seattle and Portland.

Most of the form panels are 2 x 6 ft., with ¾-in. exterior Plyform faces, framed on the edges with 2 x 4's and reinforced with steel cross members. The job also required a number of 20-in. x 6-ft. filler panels for the inside of the curves, in which the plywood facing on each side extends past the framing, making it possible for the edges of the form to butt closely on the outside surface and matching opposite panel. These panels will be cut back to a 20-in. panel upon completion of this job.

Construction of the \$542,000 contract was begun last spring. Butler Construction & Engineering Co. of Seattle was in charge of the construction work. The project was designed by the Kaiser Engineering Co.



Strength of concrete cribbing floodwalls was proved recently during a flash flood at Spencer, W. Va. A crane, being used on a by-pass of U.S. Rt. 119 was inundated, as shown above, but the 17-ft. 11-in. floodwall, manufactured by Universal Concrete Pipe Co., Columbus, Ohio, held firm, thus saving the town from destruction or damage.

# BES-STONE Block Splitter

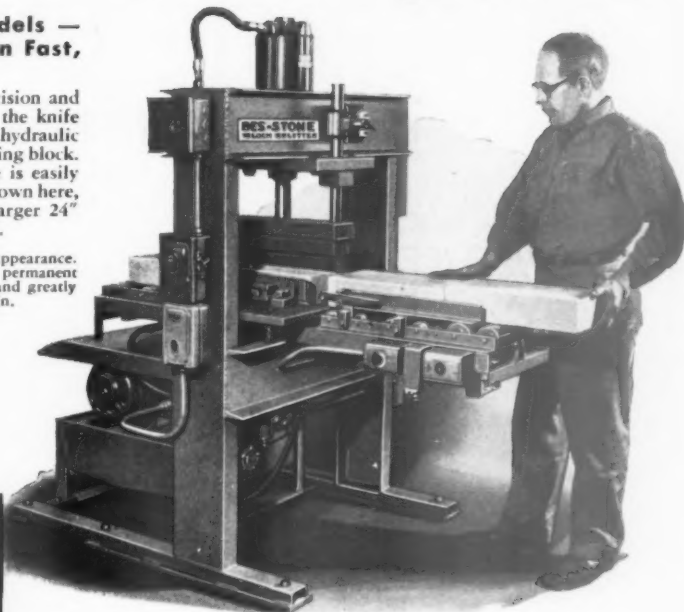
**Made in 2 Sizes — 18" and 24" Models — Produces 960 Split Block per Hour in Fast, Automatic Operation**

Splits block in a straight line, with speed and precision and with the utmost safety. The block is placed under the knife automatically... the blade descends with a smooth, hydraulic action... and the split block is ejected by the incoming block. The operator is always at a safe distance. Machine is easily adjusted for various block heights. The 18" model, shown here, splits block 16" or 18" long, 1 7/8" to 8" high. A larger 24" model splits any length up to 24", heights up to 8".

BES-STONE is a new masonry unit with a quarried stone appearance. Can be produced in many sizes and in a series of attractive, permanent colors. No conflict with conventional block. It complements and greatly increases sales of standard stripper block. Write for Bulletin.



**BES-STONE**  
*the Split Block  
with Character*



**BESSER MFG. CO. • Complete Equipment for Concrete Products Plants • Alpena, Michigan, U.S.A.**

Here's how a  
**GERLINGER CARRIER**  
**"ADDS UP"**  
for this Manufacturer:



**Lower  
Handling Costs**

**Less Block  
Breakage**

**More Trips  
Per Day**

**GREATER  
PROFITS**

L. M. Kennedy & Sons deliver concrete blocks with their Gerlinger Carrier anywhere within a 25-mile radius of their Philadelphia plant. The Gerlinger each trip delivers 6-ton loads of 400 blocks directly to the customer's job, spotting the load within arm's reach of the block layers. A special power attachment enables the carrier operator to gently unload the blocks, with the cube load remaining intact. The firm reports that the use of the Gerlinger Carrier has tripled the number of deliveries it can make—over its former conventional delivery method. Block breakage in transit has almost entirely been eliminated.

Gerlinger Carriers are built to handle such heavy loads—with easy maneuverability in city traffic and surplus power for traction over rough terrain. Full-visioned operator's seat gives full view of load and road. These—and other job-proven features—make Gerlinger Carriers all-purpose, cost-cutting material handlers. For specific data to fit your operation drop us a card today.

Four hundred 30-lb. concrete blocks are loaded on the Gerlinger by lift truck in this unique application in the yard of L. M. Kennedy & Sons.



Lower: Minutes later this giant load is delivered intact to customer's job within easy reach of workmen.



G-250

**GERLINGER CARRIER CO., DALLAS, OREGON**

# FROM CANADA TO FLORIDA SUPERLITE UNLOADERS FROM THE ATLANTIC TO THE PACIFIC

OUR CUSTOMERS ARE GAINING A COMPETITIVE  
ADVANTAGE OVER COMPETITION THROUGH  
MORE EFFICIENT AND CHEAPER UNLOADING

## COMPARE — COMPARISON PROVES

WHY MANY PROGRESSIVE PRODUCTS MANUFACTURERS  
ALL OVER THE LAND ARE SENDING REPEAT ORDERS

A 2c card will bring you complete information  
that will save you thousands of dollars

## BUILDERS EQUIPMENT CO.

4012 North Central Ave., Phoenix, Arizona

## SOFFIT BLOCK

(Filler for Floors and Roofs)

Opens Up New Markets

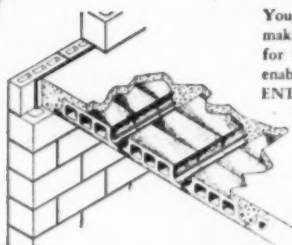
- FIRESAFE
- PERMANENT
- RIGID
- ECONOMICAL



Gives FLOORS and ROOFS  
Lifetime Permanence ...  
Cuts Construction Costs!

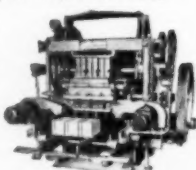
Your profits will greatly increase by  
making and selling Soffit Filler Block  
for floors and roofs. Soffit Block  
enables your customers to make an  
ENTIRE structure firesafe and perma-

nent, and do it economically.  
Illustration at left shows  
integral joist and slab of  
reinforced concrete. Meets  
standard building code re-  
quirements. Recommended  
by architects and builders.



### BESSER VIBRAPAC

Soffit Filler Block are made on the same  
machine that produces quality concrete  
load-bearing block for walls, in all styles  
and sizes, using one set of Plain Pallets.  
Write for literature and names of Vibra-  
pac plants making Soffit Block.



### BESSER MANUFACTURING CO.

ALPENA, MICHIGAN, U. S. A.

Complete Equipment for Concrete Products Plants

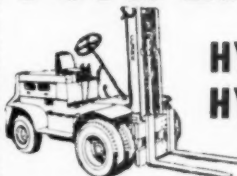
## SILICA FLOUR for AUTOCLAVE BUILDING PRODUCTS

### SOUTH RIVER SAND CO.

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## Fork Lift Trucks

WITH PNEUMATIC TIRES



**HYSTER** 15,000 lbs. capacity.

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**CLARK** 4,000 lbs. capacity.

**CLARK** 6,000 lbs. capacity (dual drive tires) made in  
1953. Used only 9 months.

**ROSS** 6,000 lbs. capacity.

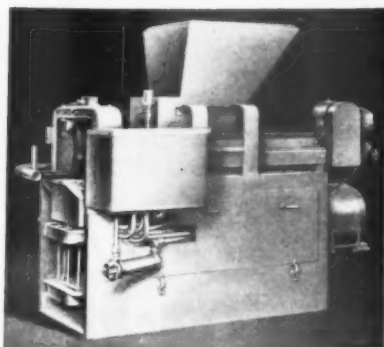
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**A & A Machinery Corp.** 460 Troutman St., Brooklyn 37, N. Y.  
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Available  
**ON LEASE**  
 to Men of Responsibility

**HYDRO  
 KORPAK**

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 Superfine  
 Block  
 Machine

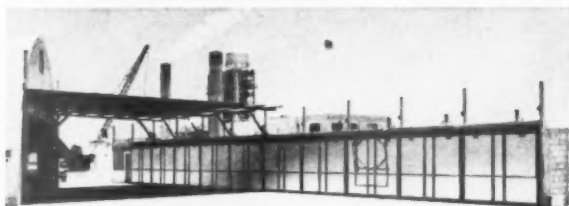


A limited number of Hydro-Korpak Machines will be made available to reputable manufacturers on a monthly rental basis. Write at once for details of an arrangement which can greatly reduce your overall operating costs.

**CONCRETE EQUIPMENT COMPANY**  
 544 Ottawa Avenue Holland, Mich.

K-2

**SAVE FUEL • REDUCE CURING TIME  
 • CUT COSTS • UP PROFITS**  
 with ***Standard* KILN DOORS!**

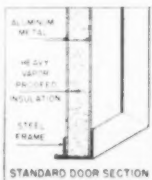


● This is the modern STANDARD kiln door installation of Portland Industries Inc., Riviera Beach, Florida. C. R. Wilson, the firm's Executive Vice President, writes: "Our Standard kiln doors have been very satisfactory."

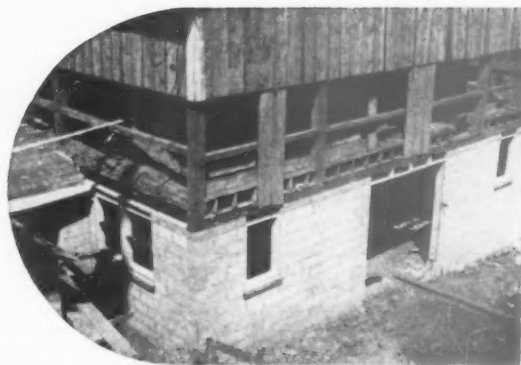
To suit your individual requirements, three types of STANDARD kiln doors are available—the sliding carrier-type (shown above), the top hinge-type (which is pulled up by a hoist), and the side hinge-type.

**CHECK THESE FEATURES**

- ✓ Heavy Aluminum Sheets on Both Sides of Thick Vapor Proofed Insulation.
- ✓ Rugged Steel Frame.



*Get the Best — Send for Details Now*  
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Repairing and remodeling existing structures and building additions to them is accounting for a growing share of the building dollar. Estimates indicate an \$8 billion annual business for this type of construction.

Millions of urban and farm homes, commercial, industrial and farm buildings need remodeling and modernizing. Get your share of this big market by bringing as many prospects as possible to you for help and advice.

To reach the maximum number of prospects in your market area at lowest cost use local advertising. When prospects call send them to architects, builders and lending agencies experienced in concrete masonry construction.

You'll find it helpful to use the mats, illustrations and copy ideas included in the handy "Concrete Masonry Advertising Kit" published by the Portland Cement Association. Write for free copy containing complete information.

**PORTLAND CEMENT ASSOCIATION**

A national organization to improve and extend the uses of portland cement and concrete through scientific research and engineering field work

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# BERGEN FRONT PALLET RETURN

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away in 30 seconds!*

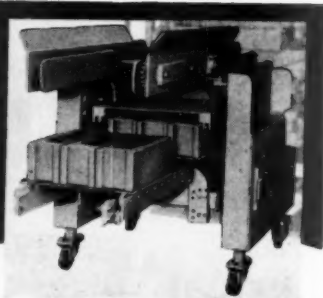
*Feeds Pallets OVER  
outcoming block!*

- Takes 18-1/2 x 26" or 19 x 27" pallets
- Adjustable for block heights-3-1/2 to 9-1/8"
- Can't be fouled by falling concrete
- Eliminates pallet chain conveyor ass'y

May be used on  
Besser Vibrapac

Write for bulletin

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## EVERY TIME and every time it empties, it SAVES YOU MONEY!

Your bankroll is taking as bad a beating as your buckets—if you have to kick, bang and batter them constantly to get them clear of jammed or frozen plugs of sand or other granular loads.

Loads *can't* stick in PEKAY M-T-Matic buckets, even if frozen or close-packed! The separately mounted stripper plate applies irresistible leverage to bucket contents—empties completely on every trip! You handle more material at the same or higher belt speeds—cut belt replacements too!

the patented

## PEKAY M-T-MATIC ELEVATOR CONVEYOR BUCKET

Available in all standard sizes  
Thousands of M-T-Matics now in use are making money for users everywhere, handling sand, cement, similar materials. Easy to install on any elevator conveyor. Quick deliveries!

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Separately mounted back automatically acts as stripper-plate to assure complete emptying. Irresistible leverage develops as bucket goes over top pulley, sweeping contents entirely clean. Buckets have standard pickup capacity. Double mounting makes belts last much longer.

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TESTED!

Butt Weld

JOB  
PROVED!

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WITH TRUSSED DESIGN

The Backbone of Steel for EVERY masonry wall. Dur-O-wal is an electrically welded, custom-designed reinforcing member that lies fast in the mortar joint.

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NOW MORE  
THAN 140 LICENSED MANUFACTURERS  
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Patented  
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Concrete STEPS

A Small Investment  
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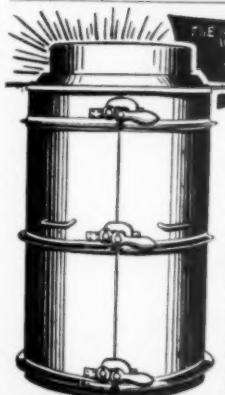
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THE  
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FOR CONCRETE PIPE

The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years' service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that Quinn pipe forms and Quinn mixing formulas combine to produce the finest concrete pipe at lowest cost.

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For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell end pipe at lowest cost.

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Also manufacturers QUINN CONCRETE PIPE MACHINES

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# Increase **BLOCK** Output with a Sturdy *Erickson*

The Platform Truck  
"Custom-Built" for your  
racks—from 60 to 108  
or more 8x8x16 blocks.



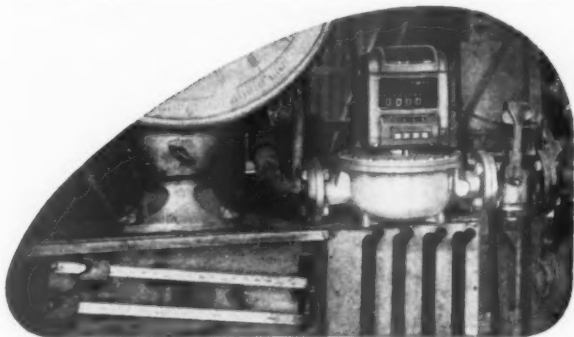
"THE BACKBONE OF BLOCK PRODUCTION" is what users still call the Erickson Platform Truck. Its rugged dependability to handle loaded racks from block machine to kiln assures top speed production with no delays or shut downs. The Erickson platform picks up all racks from the ends and places them close together in the kiln—no wasted space. For faster operation Erickson now offers 4 speeds forward and 4 speeds reverse. We will build you a truck exactly suited to your racks and doorways. Also fork type trucks.

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## Better Concrete with **METERED** Water

Most important problem in ready-mix concrete is control of water . . . and the simplest, surest control is this Auto-Stop water meter. Just push buttons to set pounds or gallons required, open the valve, and the meter shuts off automatically. Speeds loading, and improves block machine performance. Easy to read, saves space, and reduces structural requirements. Round dial non-Auto-Stop also available. Write today for full details . . .



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MANUFACTURING COMPANY

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## BIG PROFITS for SMALL PLANTS with the famous FMC-180

WRITE TODAY  
FOR COMPLETE INFORMATION,  
PRICES, TERMS  
ON THE

FMC-180 automatic concrete block machine  
FMC-400 fully automatic double block machine  
FMC Mixers; one, two, three and four-sack sizes  
FREE—Concrete block plant layout!

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- Reichard-Coulston synthetic and natural cement colors are limeproof.
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OUR 100th YEAR: 1854-1954

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Lakeland Engineering Associates prestressed concrete designs are available for franchise manufacturing to qualified casting yards. LEAP concrete is made by the pretensioning method in long casting beds to make flat slabs, composite slabs, tee slabs, T beams, tee beams, columns, piling, power poles, fence posts, lintels, sea walls, bleachers and many other products.

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### LAKELAND ENGINEERING ASSOCIATES, INC.

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We have two and three yards, all High Dumps, some mounted and some unmounted.

Prices: You will be surprised.

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An established business, complete block plant equipment including ROCKCRETE VIBRATING machine with 4 & 8 inch mold boxes 4000 Modular pallets 40 steel racks 28 cu. ft. mixer, Brikcrete Machine with 4 & 8 inch attachments and flat pallets with 16 cu. ft. Dunn Mixer, Tow Motor 4000 lb. capacity, elevator for unloading aggregate in over head bins, conveyor for unloading cement, boiler for curing blocks, all in good condition. Sacrifice for quick sale.

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## "READY-MIX TRUCKS FOR SALE"

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- 1—2 yd. Rex Mixer, Waukesha engine power, mounted on a 1948 International single axle, good condition, repainted.
- 1—3 yd. Smith Mixer powered with Continental Engine, mounted on International K-8F, tandem rear axles, repainted.

All priced right, ready to go.

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BIONETIC is a safe, sure, economical method. Cleans sewage solids from tank. Eliminates odors. Cleans tile field, prevents plugging. Cleans grease traps. Harmless to humans and plumbing.

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BIONETIC at \$4.25 per pound, twelve one-pound containers to the case. Bulk prices on request.

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1942 BESSER SUPER VIBRAPAC WITH AIR HOLISTS. VERY GOOD RUNNING CONDITION.

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Air and Top-Sealed, four in one adjustable Vault Mold making four sizes \$885. Round Septic Tank mold \$825. Barbecue mold making three models \$650. Garbage Bin \$425. No franchise to pay.

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## USED BLOCK MACHINES

2 Brikcrete machines. Modern Masonry, Fort William, Ont. Canada

Fleming 180. Scheel Block Co., Brandon, Manitoba, Canada

F.M.C. 180. This machine has 7 molds—mostly for manholes. Fortress Concrete Products, Melrose Park, Ill.

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Lith-I-Bar or Multiplex 2 block machines

Columbia 2-2½ or 3 block machines, excellent condition—nearly new—to be replaced by newer 1954 model capable of 12" high mold box

Several formed pallet Joltcretes and George machines and one Barnes Prado Tamper with all attachments for manhole blocks including the "cone".

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## FOR SALE

Stearns Joltcrete's in A-1 condition Relinable modular attachments.

1—8" Siding attachment for No. 9 Pressed Steel and Cast Iron Pallets Chase #294 Steel Racks, 72—8" block cap.

Turntables

Reconditioned motors for Joltcretes.

Let me know your wants in good used block making equipment.

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## FOR SALE COMPLETE BLOCK PLANT EQUIPMENT

Besser Victory Vibrapac, complete with 1½" - 2½" - 3½" - 5½" - 7½" - 9½" - 11½" - 7½" Header - Brick & Split-Rock molds. 2,000 5/16x18x18 pallets, mixer and racks.

This machine makes two 7½", four 3½", three 5½", twenty brick, one 9½" or one 11½" units per cycle. Machine operates at 4½ cycles per minute.

This is a complete set-up, being used every day. Can be inspected in Wisconsin.

### WRITE BOX M-24, CONCRETE PRODUCTS

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  - 2—Regular Mold Boxes 8x8x12 Hollow Block.
  - 1—Bevel Mold Box 8x8x12 Hollow Block.
  - 1—Mold Box Semi-Solids 8x8x12 Block.
  - 1—Mold Box Bevel Corners, Core, Core Bars & Stripper Plates 8x8x12 Block.
  - 1—Double Partition Mold Box & Half Block Attachment 4x8x12 Block.
  - 2 Pressure Heads & Plate Assemblies.
  - 200 Transite Pallets.
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  - 1—Columbia 15 lb. Low Pressure H.T.F.B. Boiler 48" Diameter complete with stack.
  - 1—Iron Fireman Stoker.
  - 1—Automatic Electric Transporter and Charger—Model TW-4972.
  - 1—Small Steel Hopper 30 cu. ft. capacity.
- All above equipment is in good working order, painted and ready to go to work. All inquiries will be answered by return Air Mail.

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Joltcrete #7—with 4, 8, 12" Mold Boxes, 18 cu. ft. Stearns Mixer, 18 ft. Skip Loader, 1200-12", 2700-8", 2100-4" Hollow Pallets 45%-425-4" Solid Pallets, Hand Jack Lift Truck, 35 Racks 64 block capacity, Multiplex Chimney Block Machine, 200 pallets, Pallet Dunker, Lintel Molds. Priced for Quick Sale. Ill health reason for selling—all Equipment now in use.

Box M-29 CONCRETE PRODUCTS  
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For the block manufacturer. Help your contractors and bricklayers get quicker, easier and straighter masonry construction with U.S. tools that carry YOUR advertising. U.S. Corner ties, Linestretchers, Line Pins and Twigs. We also wholesale a full line of tools for the block layer. Write for catalog and prices.

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2—Used Septic Tank Farms and Handling Equipment.

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## CONCRETE BRICK COLORS CEMENT COLORS MORTAR COLORS

made by

BLUE RIDGE TALC CO., INC.  
Henry, Virginia

## WHERE TO BUY

### FORK TRUCKS A REAL BARGAIN BUY

We have five Clark Fork Trucks, 4000 pound capacity, solid tires. Perfect running condition. A written guarantee with each fork truck. Each unit has a maximum height of 108 inches and collapsed clearance of 84 inches. We have a very desirable lease purchase plan on these Fork Trucks.

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44 year old going concrete products plant. Make gravel & light weight building blocks and concrete stave silos. Reasonable price and terms, with small down payment. A good opportunity to start paying business of your own with limited cash outlay. Reason for selling. Health and age.

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### UNBREAKABLE

### PALLET RINGS

Write for full information  
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**U.S. SECURITY BONDS**

*NOW!*

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### BESSER "SUPER" VIBRAPAC

With one attachment. A-1 condition. Priced to sell.

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Telephone: Vinewood 2-0200

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99 DEERING ROAD, MATTAPAN, MASS.

Hydro-pack concrete block machine, dies for 5"-8"-10" block, mixer, 48 drying racks, warehouse jack.

Quick sale. Contact  
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### BESSER "VICTORY" VIBRAPAC

4", 8", 12" and Brick Attachments. Air Offbearing Hoist.

2200 Plain Pallets, 13x18 1/2".

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1 lot of Jolt Crete Parts.  
1 DR4 Bulldozer. 1—Stearns Yard Hoist.  
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Proved to last as long or longer—yet cost considerably less. Write for prices.

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50 metal racks for cored pallets, send sketch with sizes marked and prices to

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To Concrete Block Producers

Linera and Cores. Outlasting Others by 3-1. Write Today—

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Colo. city 25,000. Going business, five room modern all-concrete home, full basement. Stearns Clipper equipment, LT-44, 1953 GMC 3 1/2 ton truck, 1/4 block land good location. Priced low for quick sale, owner has other interests.

**BOX M-28, ROCK PRODUCTS**  
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Hydraulic, Automatic Block Machine, 3 at a time. Plain Pallets 18 1/2 x 26". Half Height or full height block. Quick changeover. \$6,000.00.

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With FORMULA NO. 640

A clear liquid which penetrates 1" or more into concrete, brick, stucco, etc., seals—holds 1250 lbs. per sq. ft. hydrostatic pressure. Cuts costs: Applies quickly—no mixing—no cleanup—no furring—no membranes. Write for technical data—free sample. **HAYNES PRODUCTS CO., OMAHA 3, NEBR.**

**HANSON Model 41, 1/2 yd. Trenchhoe, GM Diesel overhauled December 1953, trenchhoe attachment new, 40' crane boom.**

Trenchhoe \$6500.00  
Crane \$5850.00  
**BUILDERS RENTAL EQUIPMENT CO.**  
1240 McCook Avenue, Dayton, Ohio



**designed . . .**

**... FOR CUBING AND LOADING BLOCKS**

**THAT'S RIGHT**, the new Truck-Man Model 40, two ton, High Lift was designed from forks to engine, especially for handling blocks. It is not just another industrial truck with special forks.

**BIG** 7.50 x 15, 10 ply Road Lug pneumatics on the drive wheels and 6.00 x 9, 8 ply rib pneumatics give you plenty of traction and footing for yard work. The big Ford engine, for ample power, and the short, 72", turning radius for peak maneuverability, mean that the Truck-Man 40 will really do a job in curing kilns and plant as well.

**HERE ARE THREE BIG REASONS WHY THE 40 IS EASY AND ECONOMICAL TO MAINTAIN, TOO:**

- 1 RUGGED** — The big Ford Industrial Engine, oversized clutch, heavy duty transmission and axles insure less maintenance.
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- 3 STANDARD FORD PARTS** — Serviceable at any Ford garage, include: hydraulic brakes, engine, differential, clutch, drive axle, and wear parts of steering axle.

**truck-man**

Div. of The KNICKERBOCKER CO.  
650 Liberty St., Jackson, Michigan

Write or check coupon and mail for catalog with complete details on the Model 40 and 8 other versatile Truck-Man trucks.

☐ Have Salesman Call

☐ Send Catalog and Further Information

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Title \_\_\_\_\_

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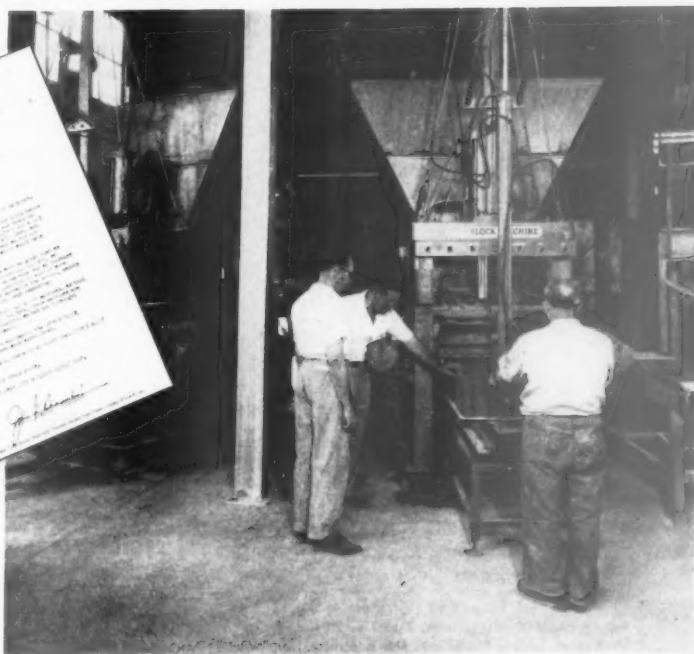
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In plant after plant, it has been proven

## LITH-I-BLOCK

will earn you more in the long run

**COMPARE  
THESE RESULTS  
WITH YOUR  
OWN NEEDS:**



"In the first part of 1948, we decided to go into the block manufacturing business. After making an intensive survey and study on all the machines on the market, we decided that the LITH-I-BLOCK L-3 was just what we were looking for. It was compact, efficient, and economical both in maintenance and purchase price, and we did not need a machine expert for adjusting minor repairs which would have to be made periodically.

This was very satisfactory, until our sales were so great that we could not keep up with our block demands. Consequently, in 1950, we purchased a LITH-I-BLOCK L-5. With this improved machine and an increase in daily production, we were in a much better position to solicit more

and better business. By this time, rumor had spread on the strong, smooth and true blocks we were making and our business kept expanding.

In June 1953, we purchased two (2) LITH-I-BLOCK L-5 machines, so that we could keep up with our growing demands. To date, these machines are running constantly; and each day we are thankful we had the foresight to pick such durable and economical equipment.

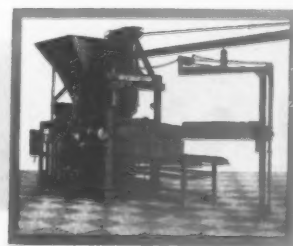
Along with purchasing LITH-I-BLOCK equipment, the LITH-I-BLOCK competent and efficient service was very much appreciated.

If we had it to do all over again, there is no doubt that LITH-I-BLOCK would be our choice."

*Write for the names of nearby Lith-I-Block owners.*

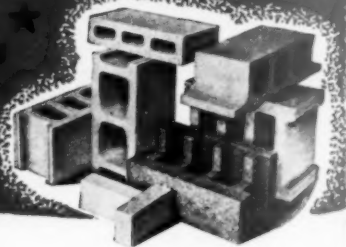
*Prove Lith-I-Block superiority for yourself.*

**LITH-I-BAR COMPANY**  
HOLLAND, MICHIGAN



**"We'll be here tomorrow to back up what we sell today"**

# Another BESSER Booster



★ This is the 107th of a series of ads featuring leaders of the Concrete Products Industry who are stepping up block production with Besser Vibrapac machines.



● George Parisian, President and Richard Parisian, Vice President of Standard Block and Supply Company.



● Split Block Planter in office lobby of Standard Block and Supply Co. Note the beautiful texture of Split Block (Ranch-Stone) produced on the Besser Automatic Vibrapac.



● Exterior of Standard Block and Supply Co. office, showing liberal use of Ranch-Stone made on Bes-Stone Block Splitter.

## Lansing, Michigan Block Plant Operator Prefers VIBRAPACS for Fast Production of Quality Block

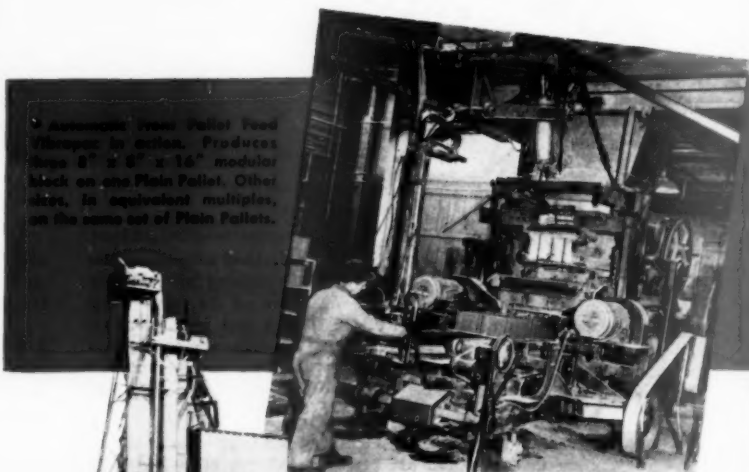
Standard Block and Supply Company, Lansing Michigan, started to manufacture block in 1939, but it wasn't until 1950 that the company forged ahead in earnest. In that year, they installed their first Automatic Vibrapac machine, a Front Pallet Feed model. Referring to this Vibrapac, President George Parisian states, "We believe it is the most advantageous machine to use. It has less down time, produces better block, and operates at less maintenance cost."

With the installation of the Vibrapac, Standard Block has been able to broaden the scope of its production. In addition to conventional block, the company produces Soffit Filler Block for floors and roofs, Ranch-Stone, Chimney Block and a variety of concrete specialties, such as lintels, steps, septic tank covers, sump pump tile, etc. Most of the units are being used for homes and commercial buildings.

Ask your Besser representative how you can step up block production in your products plant with Automatic Vibrapacs. Write today.

**BESSER MANUFACTURING CO. • Box 135 • Alpena, Mich., U.S.A.**

Complete Equipment for Concrete Products Plants



● Automatic Front Pallet Feed Vibrapac in action. Produces 8" x 8" x 16" modular block on one Plain Pallet. Other sizes, in equivalent multiples, on the same out of Plain Pallets.



**BESSER**

50th Anniversary

1904-1954

**A Half Century of Concrete Masonry Progress!**

## GAYCO CENTRIFUGAL SEPARATORS

GAYCO Separators, equipped with the adjustable centrifugal sizing fan — an exclusive GAYCO feature — make closer separations. Closer separations bring about higher production through efficient removal of the fines made by the mill. Closer separations bring about higher quality products by eliminating all undesirable oversize.

**"TIMKEN BEARING EQUIPPED"**

GAYCO brings you all these:



**UNIVERSAL ROAD MACHINERY CO.**

Robert M. Gay-Division  
Factory and Laboratory, Kingston, N.Y.  
117 LIBERTY STREET NEW YORK 6, N. Y.  
Canadian Representative: F. H. Hopkins & Co., Ltd.  
8500 Decarie Blvd., Montreal, Que.

*You Can Control* **DUST**  
with **AQUADYNE**  
Multiphase **Wet Water**



**AQUADYNE**  
CORPORATION

441 LEXINGTON AVENUE  
NEW YORK 17, N. Y.  
TEL.: VANDERBILT 6-2750

The instrument man's  
**"Man Friday"**



**High-fidelity  
Foxboro  
Portable  
Potentiometer**

— metal cased and covered

You'll never run out of uses for this rugged, precision portable potentiometer. It's the most indispensable tool in the instrument man's kit! Use it to check overall accuracy of your temperature instruments and thermocouples; as a substitute temperature instrument during emergencies; for exploring temperatures not requiring continuous measurement.

The Foxboro Portable Potentiometer Indicator is accurate to  $\frac{1}{4}$  of 1% of scale. Temperature dial has an extra long (17") scale for close, accurate reading, and vernier dial for precise balancing. Supplied with either single or double temperature scales to provide for different types of thermocouples ... or for use with resistance bulbs. Weighs only 11 $\frac{1}{4}$  lbs. Rugged metal case-and-cover protects the instrument from rough handling. Write for descriptive Bulletin A 303-1 for details of this outstanding portable test instrument. The Foxboro Company, 304 Norfolk Street, Foxboro, Massachusetts, U.S.A.

**RECORDING • CONTROLLING • INDICATING  
INSTRUMENTS**



# WHERE TO BUY

## BONDED QUARRY EQUIPMENT

WRITE, WIRE OR PHONE. IMMEDIATE SHIPMENT FROM STOCK

### NEW TROUGHING IDLER CONVEYOR BARGAINS

We take our loss on our stock of short length belting and previous model idlers. You save as much as 50% by buying the BONDED CONVEYOR SPECIALS listed with conveyor belting in two pieces. Belting is 4 ply, 28 oz. duck, 1/4" top rubber cover and 1/32" bottom cover.



Belt Width	Length of Conveyor	List Price	Sale Price
18"	25'	\$1229	\$ 658
18"	45'	1839	969
18"	50'	2054	1043
18"	85'	3299	1581
24"	25'	1322	729
24"	45'	2062	1085
24"	60'	2617	1355
24"	100'	4097	2037
30"	25'	1421	806
30"	65'	3101	1617
30"	80'	3731	2295

Other lengths and belt widths at bargain prices

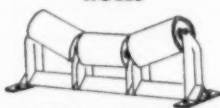
**CONVEYOR BELTING**  
NEW HEAVY DUTY RUBBER BELTING HAVING HIGH TENSILE STRENGTH, TOUGH COTTON DUCK, STRONG CARCASS AND PROPER FLEXIBILITY. FOR BOXES, BAGS, AND BULK MATERIALS. TROUGHS EASILY.

FAMOUS BRANDS AT DEEP CUT PRICES. FRESH STOCK.

Width	Ply	Top Bottom	Duck	Price
18"	4	1/32"	28 oz.	\$2.50/ft.
24"	4	1/32"	28 oz.	3.23/ft.
30"	4	1/32"	28 oz.	3.97/ft.

Additional widths and plies available at low prices. Write for free sample.

### TROUGHING IDLERS & RETURN ROLLS



3-roll Troughing Idlers for these sizes:	
16" belt.....	\$17.25 30" belt.....\$19.50
18" belt.....	18.00 36" belt.....20.25
24" belt.....	18.75 48" belt.....21.75
1-roll Return Idlers for these sizes:	
16" belt.....	\$6.75 30" belt.....\$8.25
18" belt.....	7.13 36" belt.....8.75
24" belt.....	7.50 48" belt.....10.25

All steel. Interchangeable with other well-known makes. Replaceable ball bearings. Rust proof ball races—maintenance is negligible.

### HEAD AND TAKEUP PULLEYS

All welded steel head and tail pulleys and assemblies complete.

Priced from .....\$60.00

### SPEED REDUCERS

Bonded offers speed reducers for fractional to 60 H.P. motors in a variety of ratios.

Priced from .....\$32.00

### BUILD YOUR OWN CONVEYOR

Ready-Made Head, Tail and Intermediate Conveyor Sections  
All Types Idlers, Return Rolls and Belting in Stock

Holdback	Head & Tail	Roll Idler	Self-Aligning Idler	Guide Idler	Wing Pulley
\$90.00	\$171.00	\$6.38	\$56.50	\$13.75	\$74.00

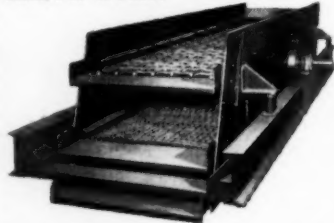
You are welcome to visit the Bonded plant at any time. Discuss without obligation, your requirements with our engineers or Write for Catalog and Prices.

## BONDED SCALE AND MACHINE COMPANY

Mfrs. of Scales, Conveyors, Conveyor Parts, Idlers, Vibrating Screens, Crushers and Feeders  
128 BELLVIEW, COLUMBUS 7, OHIO PHONES: Garfield 2186; Franklin 6-8898, Evenings

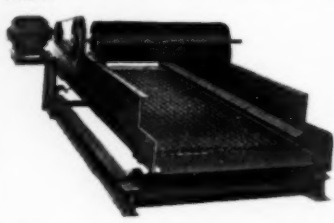
### VIBRATING SCREENS

For sizing and separation of Rock, Sand, Gravel, Slag, Coal and many other uses. Shaft is mounted on self-aligning bearings and made in heavy duty eccentric shaft types; 1 to 5 decks, 3'x8' to 5'x14'.



Priced from .....\$1195.00

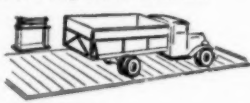
Bonded General Purpose Screens are ideal and economical for medium operations. Sizes to 3'x8' in 1 to 3 decks. Wire cloth or plate included.



Priced from .....\$395.00

### MOTOR TRUCK SCALES

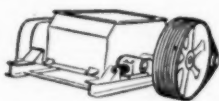
For stationary and portable applications. Scales have steel lever system complete with structural steel weighbridge. Capacities to 50 tons. Recording beams available.



20 Ton Truck Scales .....	\$525.00
26 Ton Truck Scales .....	582.00
33 Ton Truck Scales .....	825.00

### CINDER, PUMICE, PERLITE CRUSHERS

Bonded double roll crushers are available with Smooth, Fine or Coarse Corrugated rolls or any combination of same for crushing Lightweight Aggregate, Pumice, Perlite, Chemicals and similar materials. Capacities to 100 tons per hour. Steel hoppers included.



Priced from .....\$479.00

## Special Crushers !!

Pioneer 40x22 roll crusher Diesel powered.  
Cedar Rapids 40x30 Hammermill Twin GMC Diesel.  
Jeffrey Flex-Tooth 42x36" hammermill.  
Pennsylvania C-4-30 Reversible Hammermill.  
Jeffrey Type B Hammermill 88x12".  
Raymond No. 412 bowl pulveriser mill.  
FARREL BACON 36" x 48" Jaw Crusher.  
Traylor TY 4' with 200 hp. electric motor.

### DREDGES

Ellisott 12"x10" new pump with new V-12 355 HP Diesel engine. Port. steel hull.  
Ellisott 8' with cutter. Diesel Hull 48"x18"x3'6"  
8" Hydraulic. Diesel. On 32"x8" steel pontoons.  
Amaco 10" Diesel power portable. Excellent.  
6" portable Diesel complete with cutters, etc.  
8" H-P twin Diesel drive. Complete.

### CONCRETE PLANTS AND EQUIPMENT

Heisel 1000 bbl. cement silo with tier scales, etc.  
Smith 56-S two yard tilting mixer. Complete.  
Johnson 200 yd. 5 comparts. Complete large plant  
Johnson 150 yds. new 1950 3 comp. agr. one cement ground silo 500 bbl. two 28-S mixers.  
Johnson 55 yds. 5 comparts. agr. and cement 1050 bbls. silo.

Fuller-Kinyon Model H Port. cement conveyor.  
Butler 250 bbl. cement H-K 100 ton 3 comp. agr.  
NEW H-S 100 ton agr. bin 3 comp.  
NEW H-S 400 bbl. cement bin complete.

### CRUSHING PLANTS

Cedar Rapids Portable Super Tandem, excellent.  
Pioneer 40-V. New 1946. Portable. Diesel power.  
Pioneer WA-300, crushing, washing, screening  
Cedar Rapids AAA Port. Primary crusher 20x36  
Cedar Rapids 40x30 Port. Secondary. Diesel.  
Cedar Rapids Portable Master tandem.

### CRUSHERS

JAW: Acme 10x20, 14x26, 14x28, 10x42, 16x32, 18x32, 25x40. Eagle 20x36. Diamond 24x36.  
Cedar Rapids 10x20, 20x36, 25x40. Farrell 10x20, 13x30, 14x36, 18x36, 36x48. Buchanan 36x42.  
Good Roads Reliance 15x30. Traylor 18x36, 24x36  
Allis-Chalmers 30x18. Good Roads 10x20. Tel-smith 18x32. Champion 10x20, 10x40, 12x30, 15x30  
GYRATORY: Allis-Chalmers-McCully, 6", 7", 8", 9", 12K, 20", 30", 42", 14", Newhouse, 24", 36", Gyrasphers, 18", 25". Intercon Tel-smith, Tel-smith 5H, 10-15, 12-18, 18-B. Kennedy Van Buren 7, 19, 25 1/2"-R. 37. Traylor Ty 1'8", Ty 2'4", T-4 1/2".  
ROLL: Cedar Rapids 40x20. Diamond 40x22. Pioneer 30x18. Tel-smith 24x16. Pioneer 30"x18". New Holland 24x18.

HAMMERMILL: Size 4 Williams Jumbo, Pennsylvania 8X2, 22x22. Cedar Rapids 20x32. Jeffrey 26x42. Jeffrey 26x24, 35x10.  
BALL MILL: Hardinge 10'x18". K.V.S. 6'x2" Type 3M Air Sweep J-H 6'x16". Hardinge Contcal 6'x22". Colorado Iron Works 5'x16". Marcy No. 94 1/2. Hardinge contcal 10'x36".

ROD MILL: Marcy 2'x16", 3'x16". Allis-Chalmers 4'x8". Hardinge No. R 206. Marcy 5'x12". Hardinge 4'x22".

CONC: Symons 2' coarse bowl, 3' standard head.  
TUBE MILL: Smidish 5 1/2'x20, K.V.S. 4'x7", Traylor 5'x22".

DRIERS: Struthers-Weiss 7'x8 1/2'; others 7'x20", 6'x20", 7'x7", 6'x10" and Cedar Rapids 40'x14".

### SHOVELS-CRANES-DRAWLINES

P&H 955 ALC Crane 2 1/2 yd. 130' bm. 1951.  
P&H 625-B, 1 1/4 yd. Diesel Crane, 60' bm.  
P&H 255-A, 3/4 yd. Shovel-Crane, Diesel.  
N-W 40-D 2 1/2 yd. Dragline. Diesel, 100' boom.  
N-W Model 6, 1 1/4 yd. Diesel Shovel.  
Northwest 80-D Diesel Shovel 2 1/2 yd. New 1951.  
Lorain L-828 2 yd. Shovel-Drag-Crane 100' Bm.  
Lima 1281, 2 1/4 yd. Diesel Shovel.  
Manitowoc 3500, 2 1/4 yd. High Lift Shovel.  
Bue-Erie 54-B Diesel Shovel, 2 1/4 yd.  
Manitowoc 3500 Dragline 140' boom, new 1950.  
Northwest 25 Diesel, 1/2 yd. Shovel.  
Lorain Model MC 414, Moto-Crane, 85' Bm. Etc.

### SCREENS

Seco Double deck 6'x12'.  
Kennedy-Van B. 4'x10' three deck.  
Tel-smith heavy duty washer 60"x15".  
Diamond 4'x10' three deck.  
Lippman 4'x12' single deck.  
Stimplicity 4'x10' four deck.  
Symons 4'x14' double deck.  
Tyler 4'x10' two deck heavy duty, motor. Gen. Set.  
Hobblins Vibrex 3'x6' 4'x12' Model 48-144.

### TRACTORS

2 Cat. D8 Angledozer with DDCPU rebuilt.  
Int. TD-18A with B-E Bulldozer.  
Int. TD-34 with B-E Cable Bulldozer.  
All-Chal. HD19 Angledozer, Hydraulic.  
All-Chal. HD17 with Gar Wood angledozer.  
Allis-Chal. HD19 with hydraulic control angledozer.  
Cat. D4 Tractor with 1 yd. bucket, hydraulic

### LOCOMOTIVES

45 Ton G.E. Diesel Elec. Loco., std. ga.  
25 Ton Plymouth gas loco., std. ga.  
Vulcan 20 ton standard gauge type 4-0 gas  
30 Ton Vulcan, gas, std. ga., rebuilt.  
25 Ton Vulcan steam, std. ga., Side tank.  
15 Ton Whitecomb 36" ga. gas.  
Plymouth Model ULDA std. ga., 10 ton, Diesel.

### DERRICKS

American 30 ton Guy Derrick 100' boom, 116' mast.  
American Terry 20 ton Guy Derrick, 100' boom.  
Clyde 30 ton stiff leg 90' boom.  
Guy Derrick, 15 tons, 115' mast, 105' boom.  
American 25 ton stiff leg derrick, 90' boom.  
Special 35 ton stiff leg derrick, 100' boom.  
Nat'l Bridge 30 ton Guy Derrick, 100'.  
American 30 ton stiff leg, 100' boom.

### ASPHALT PLANTS

Barber-Greene Model 845. Complete.  
Hetherington-Berner Model M-12 1500# Pugmill.  
Maiden 4000# Complete. New 1951. Excellent.  
Overmunder Monotrol 8Ht. Mixing Plant, T-34.  
Hetherington-Berner Moto-Paver.  
Barber-Greene Plant 848 Mixer, 836 Dryer Diesel.  
Cummer 2500# Hot Mix Plant.  
Monotrol complete plant. Three years old.

### CABLEWAYS

Sauerman slack line 1 1/4 yd.; electric 90' mast.  
Sauerman 1 yd. with 100 hp. electric motor, complete.  
Sauerman 1 yd. with Wakena gas hoist.

**RICHARD P. WALSH CO.**

30 Church St. New York, N. Y.  
Certified 7-7273 Cable: RICHWALSH

## WHERE TO BUY

### IMMEDIATE SHIPMENT

#### SCREW CONVEYORS

12" x 20' with trough and drive.  
12" x 52' with trough and drive.  
9" x 166' with trough and drive.  
9" x 13' with trough and drive.  
6" x 10' with trough and drive.

#### CRUSHERS

18" x 36" Jaw, Traylor, Bulldog.  
14" x 16", Bartlett & Snow, 2 roll.  
48" Symons, vert. disc.  
42" x 14" Traylor, 2 roll.  
50" Raymond, 5 roll, high side.  
Raymond #21, feed conveyor cyclone.  
8" x 5", Sturtevant, roll.

#### BUCKET ELEVATORS

5-35'-70" cc., 12" x 6" buckets, Cent.  
2-40" cc., 6" x 6" buckets, Centrifugal.  
1-62" cc., 42" x 18" buckets, Continuous.  
1-64" cc., 24" x 12" buckets, Continuous.  
(Other Elevators from 20' to 50')

#### KILNS—COOLERS—DRYERS

8' x 125' x 3/4".  
7' x 160' x 3/4" (2).  
7' x 120' x 3/4" (2).  
310-16 Roto-Louvre.  
5' x 30' x 3/4" Ruggles-Cole.  
4'6" x 50' x 1/4" with lifters.  
5' x 67' x 5/16".  
4' x 30' x 3/4".

#### MILLS

23" x 12' Pug, double shaft, L.B.  
4' x 20' Paddle, double shaft.  
6' x 8' Abbe, ball.  
6' x 8' Patterson, Pebble.  
Size B, Abbe.

#### SCREENS

4' x 10' Seco, double deck.  
4' x 7' Tyler-Hummer, single deck.  
3' x 8' Link-Belt, double deck.  
2' x 6' Aero-Vibe with motor.  
2' x 4' Aero-Vibe with motor.

Write for Our Catalog

**HEAT & POWER CO., INC.**

70 PINE ST., NEW YORK 5

Hanover 2-4890

Machinery & Equipment Merchants

### FINAL LIQUIDATION MILLTOWN, INDIANA

- 1—Vulcan 8' x 125' Rotary Kiln complete with 50 HP motor.
- 1—Link Belt 7' x 45' Rotary Kiln.
- 1—Vulcan 4 1/2' x 50' Rotary Dryer.
- 2—Raymond #21 Pulverizers with 5'6" dia. Raymond double whizzer separators, piping, cyclones, fans.
- 2—Raymond 5 and 3 Roll High Side Mills with separators, piping, fans and motors.
- 1—450 Ton Steel Hopper 22" x 24" with 12'8" cone on structural steel legs.

- 1—Sturtevant Lab. Roll Crusher 5" x 8".
- 1—Seco 4' x 10' double deck screen.
- 2—Clyde #3 Hydrators, motor driven.
- 1—Apron Feeder 42" x 10', 10 HP motor.
- 1—Apron Feeder 18" x 11'6", 5 HP motor.
- 1—Continuous Bucket Elev. 64'6" centers, 24" x 12" x 18" buckets, 15 HP motor.
- 1—Continuous Incl. Bucket Elev. 67' centers, 42" x 18" x 25" buckets, 60 HP motor.
- 1—Troughing Idler Conveyor 18" x 65', m.d.
- 1—Link Belt Drag Conveyor 49'8" centers.
- 4—Bucket Elevators 20' to 31' centers with 6" x 4" to 8" buckets.
- 3—Bucket Elevators 35' to 42' centers 12" x 6" buckets, 5 HP drives.
- 4—Bucket Elevators 60' to 70' centers 12" x 6" buckets, 5 HP drives, 300' of 9" and 12" Screw Conveyor, drives and motors.
- 2—Allis-Chalmers 2' x 6' Vibro Screens.
- 1—Allis-Chalmers 3" x 2" Centrifugal Pump.
- 1—Ingersoll Rand Type XB, 12" x 12" x 7 1/2" x 12" Air Compressor, 60 HP motor.
- 3—250 KVA Allis-Chalmers Transformers, 2300 volt, 460/230 volt, 60 cycle.
- 2—G.E. Pyranol Capacitors, 188 KVA and 120 KVA, 460 volt 3 phase.

#### Miscellaneous Items Including

100 HP Motors ranging from 3 to 125 HP, all 3/60/220/440 volts; Structural Steel; floor plates; Electric cable; 8 and 12 ton chain hoists; 10,000 gal. Storage Tank; 5 1/2' dia. by 60' high steel stack portable belt carloader; car puller.

Representative on Premises Available for Prompt Inspection.

#### PARTIAL LIST

Send Us Your Inquiries

WIRE! PHONE! WRITE!

**BRILL EQUIPMENT COMPANY**

2401 Third Avenue, New York 51, N. Y.

### Quarry Equipment

1086/2418 Cedarapids Jr. Tandem on rubber.  
Cedarapids Rock-It plant w/2225 jaw, 3033 hammermill.

2020 Cedarapids double impeller. Rebuilt.  
936 Telamith Wheeling jaw.

10x7 Allis-Chalmers Blake type jaw crusher. Rebuilt.

#1 Cedarapids Kubit impact breaker. New condition.

B-3 Jeffery swing hammer pulverizer. Rebuilt.

15 cu. yd. Cedarapids sand drag. New.

60-ton, 2-comp., 8'x18' storage bin w/clam gates.

Special bins to your specifications.

Conveyors—18"—24"—30"—36". Also belt.

24" dia. x 30" face magnetic pulley.

#### SHOVELS AND CRANES

Lorain 75B, 1 1/4 yd. diesel.

Lorain 57, 1 1/4 yd. diesel.

Lorain L-41, 3/4 yd. shovel, clam.

Lorain 40A on Autocar 10-Wheeler.

Link Belt LS85 Diesel Combination. Rebuilt.

Unit 514, 1/2 yd. gasoline crawler shovel, rebuilt.

Lorain 30A, 1/2 yd. gas combination.

#### WELL DRILLS & TOOLS

Sanderson-Cyclone No. 42 well drill.

Sanderson-Cyclone No. 44 well drill.

#### AIR COMPRESSORS

600 cu. ft. Gardner-Denver. Rebuilt.

500 cu. ft. Gardner-Denver diesel. Rebuilt.

600 cu. ft. Ingersoll-Rand.

865 cu. ft. Gardner-Denver. New condition.

105 cu. ft. Schramm gas powered on 4 steel wheels.

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3800 Ft. Inger. Rand 635 HP, 2300 V.  
3078 Ft. Inger. Rand 500 HP, 440 V.  
3070 Ft. Chgo. Pneu. 500 HP, 2300 V.  
2400 Ft. Inger. Rand, 458 HP, 2300 V.  
2-2200 Ft. Chgo. Pneu. 440 & 2300 V.  
2-1302 Inger. Rand, 210 HP, 2300 V.  
1888 Ft. Chgo. Pneu. 350 HP, 2300 V.  
1098 Ft. Inger. Rand 175 HP, 440 V.  
781 Ft. Chgo. Pneu. 125 HP, 220/440 V.

#### LOCOMOTIVES

5-44 Ton G. E. Diesel Electric.  
1-10 Ton Davenport Gasoline.  
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1-Model E Willey—60 Ft. Boom, 25 ton Cap.  
1-10 Ton Insley 100 Ft. Boom.

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Model E for 30", 36", 42" Belt.

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10" x 17" Allis Chalmers Blake.  
40" x 10" and 30" x 10" Good Roads Roller Bearing.  
20 x 10, 30 x 13, 36 x 24 Farrel Blake.  
30 x 42 Buchanan Blake.  
42 x 48 Traylor Bulldog, Blake.  
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2 Ft. Symons, standard, boare bowl.  
#636 Allis Chalmers hydrocone.  
10" Allis Chalmers Superior McCully.  
36" Superior McCully Gyratory.

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36" x 24" Jeffery B-2.  
36" x 36" Jeffery B-3.  
#6 XD Gruendler reversible.  
#XT-11 Pennsylvania Thor.

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Hercules Junior 3 Roll Mill.  
#1 Raymond Automatic Pulverizer.  
#47 Raymond TMP. Mill—50 HP.

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4' x 20', 6' x 40', 6' x 60', 6' x 80'.

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##### 300KVA DIESEL AC GENERATOR

General Electric 440/60/3 powered by two Model 80C 844 Buda Diesel Engines, connected with Twin Disc clutches and multiple V belts. One Engine has electric starter and generator, the other has gasoline engine starter. This set complete with all controls and Panel Board.

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Westinghouse 440/60/3 direct connected to Model 80C 844 Buda Diesel engine with electric starter and generator, and complete with all controls and Panel Board. This equipment may be inspected under full operation until about May 18th. Will be available after that date account of Public Utility connection to furnish power at quarry.

ONE DIAMOND 4'x3' THREE DECK SCREEN.

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Model "WK-60" Sullivan "365" Cubic-Foot. Portable Air Compressor on four pneumatic tired wheels, Serial #23779 equipped with "D-13000" Caterpillar Diesel Engine. Price f.o.b. St. Louis—\$3450.00.

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Manitowoc Used Shovel Attachment, complete, for Model 1600 or Model 2000.

Northwest "18" Used ½ yd. Dragline.

Osgood "290" Used ½ yd. Trench Hoe.

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Hais "75W" Bucket Loader, rubber-tired. Two years old.

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3' by 12' single deck Boco Vibrating Screen with ball tray. New 1951. Excellent. \$1,000.00.

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Universal 9x36 jaw crusher  
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Morris 10" manganese gravel pump  
Pioneer 4x10 double deck screen  
45 ton, 3-comp., portable steel bin

Diamond 9x18 crusher  
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3 yd. Dumpcrete  
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These machines reconditioned in our newly-built daylight plant. Come see them!  
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1—8x36 P.B. Universal Jaw Crusher unit powered by Mpls. Moline 50 H.P. Gas power unit, V-Belt Drive. Will sell separate.

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1—10,000 lb. cap. Hawkins capstan

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span.

1—10,000 lb. cap. bridge crane, 28

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Crusher.

5' x 50' x ¼" dryer. 8' x 120' & 7' x 120' kiln.

New and Rebuilt Dryers—Kilns and Coolers

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NEW — RELAYING — TRACK ACCESSORIES  
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DRAGLINE BOOM for 80D Northwest with 2½ yard bucket and fairlead.

ENGINE UNIT MD-6 Murphy Diesel 135 HP complete.

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1200—Oiled wood pallets.

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**SHOVELS, ELECTRIC:** One 6 yd. capacity Shovel and one 5 yd. capacity combination Shovel and Dragline, 2200 volt, late models, excellent condition.

**LOCOMOTIVES:** 2-65 ton diesel electric, standard gauge, thoroughly modern, excellent condition. For sale or rent.

**LOCOMOTIVE CRANE:** Link Belt 25 ton, standard railroad gauge, gasoline powered, air brakes, cast steel trucks, bucket handling, with or without 1 1/4 yd. clam shell bucket. Thoroughly modern, excellent condition. For sale or rent, located Minnesota.

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**MINE HOISTS:** Single and double drum 100 to 1500 H.P., with all electrical equipment. Complete specifications, drawings and photos available.

**MINE HOIST SPECIAL:** Nordberg 1200 H.P., 1400 FPM, one drum clutched, wraps 100 ft. 1 3/4" rope, complete with motor and all auxiliary equipment, with or without head frame.

**CLASSIFIERS:** 4-Akins 54" x 34 ft. with lifting device, 220/440 volt motors. 2-Wemco 78" Simplex single screw, double pitch, 28 1/2 ft. tank, 220/440 volt motors. All in good condition like NEW. 1-Wemco Duplex size 72" x 32 ft., type SH, Pitchable and variable, with lifting device, 220/440 volt motor. NEW and UNUSED. Three located Nevada.

**PULVERIZERS:** Hardinge 5 ft. x 22" Ball Mill complete with motor driven disc feeder, 30 H.P. motor and control.

**JAW CRUSHERS:** 48" x 60"; 42" x 48"; 24" x 36".

**BATCH & MIXING PLANTS:** One with 55 yd. cap., 2 yd. mixer, etc. One 200 ton with one or two Koeberling 2 yd. mixers. Both plants complete with all auxiliary equipment. Photos and drawings available.

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6" x 3" to 60" x 48"



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Good Condition, Fifteen in stock.

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**Locomotive Cranes:**

1—Link Belt 20 Ton, 50 foot, standard railroad gauge, steam powered, mechanical brakes, cast steel trucks, bucket handling, with 1 yd. Owens clam shell bucket. Located Georgia.

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Gravel plant, 125-ton per hour capacity consisting of six wood bins, one 48"x26"6" triple jacket revolving screen, two vibrating screens, two sand separators, one 4' Symons Cone crusher, one roll crusher, one 8" centrifugal pump, 16" to 30" material conveyors. All plant equipment individually motor driven. Plant located adjacent to railroad on twelve acre tract, 3250' of loading tracks.

Gravel deposit depleted, available stone deposit within economical operating belt conveyor distance. Shipments may be made on two major rail lines without switch charge. Good setup for experienced stone operator. Prefer to dispose of plant as a unit but will consider selling piecemeal.

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13 Ft. Crawlers, 30" Shoes. Air Swing.  
Caterpillar Diesel D318 Engine.  
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Traylor 1 1/2" and 2 1/4" T.V. Newhouse 7, 10 and 14".

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Also complete stationary plants.

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Super Cap. encl. 20" bucket elevator 75'.  
Enclosed 8" Cement elevator 66'.  
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Continuous bucket elevator 10"-24" open and enclosed.

Continuous bucket elevators on belt.

Elevators for barrels, sacks and kegs.

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Electric and air driven small hoists.

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Crusher. Excellent Condition—  
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Just Overhauled—Top Condition. At Sac-  
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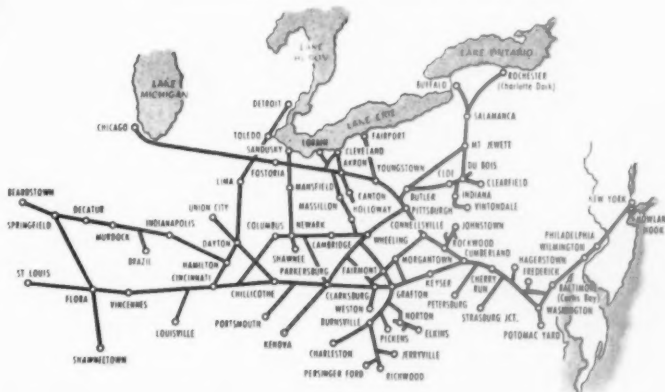
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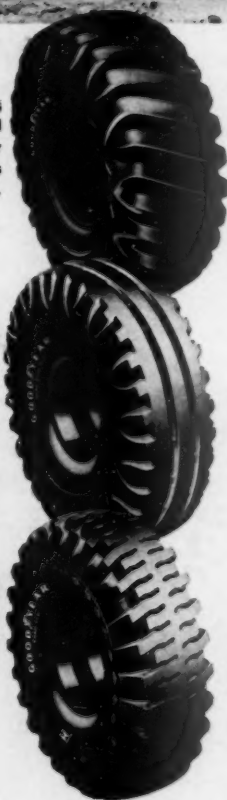


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